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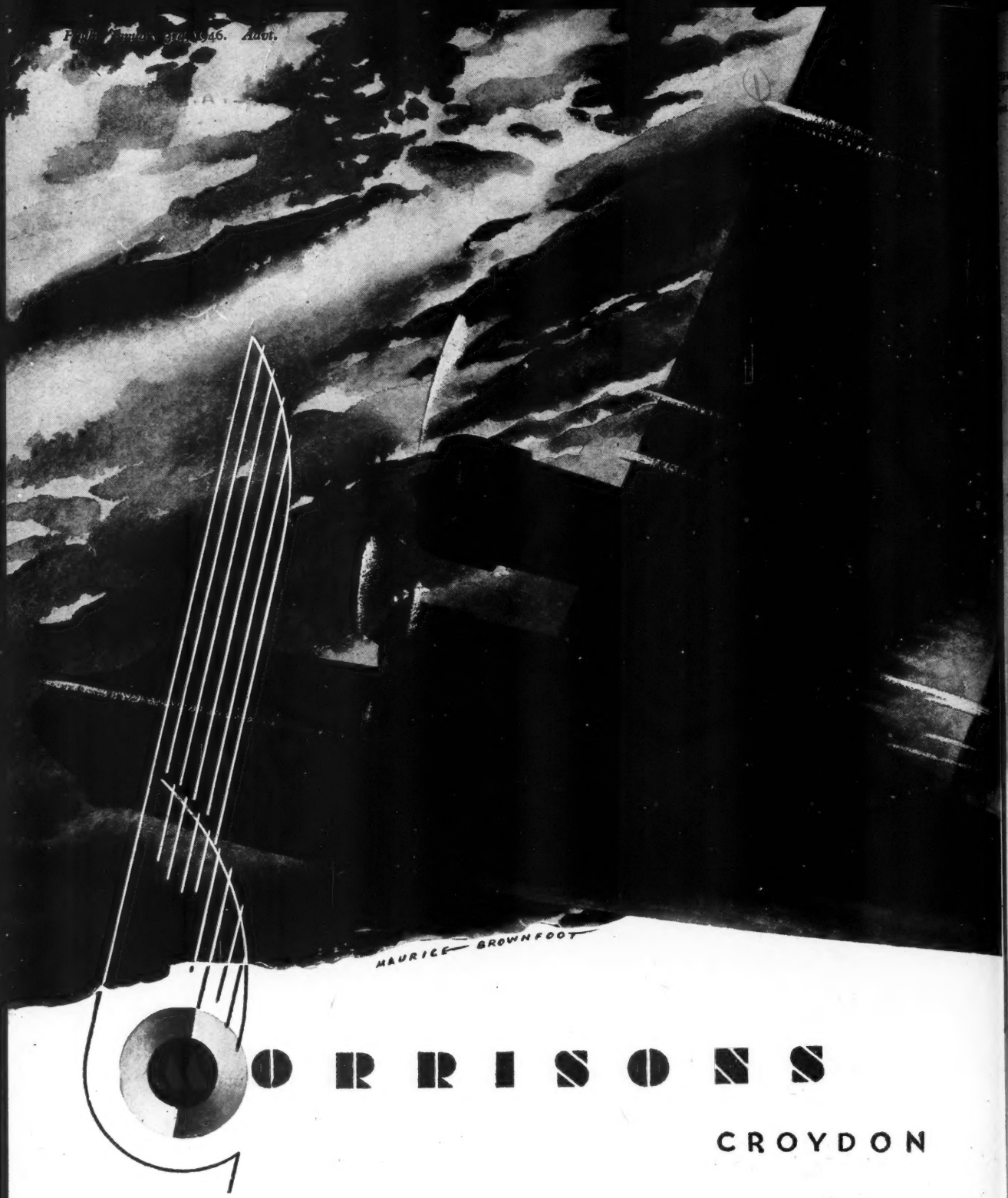

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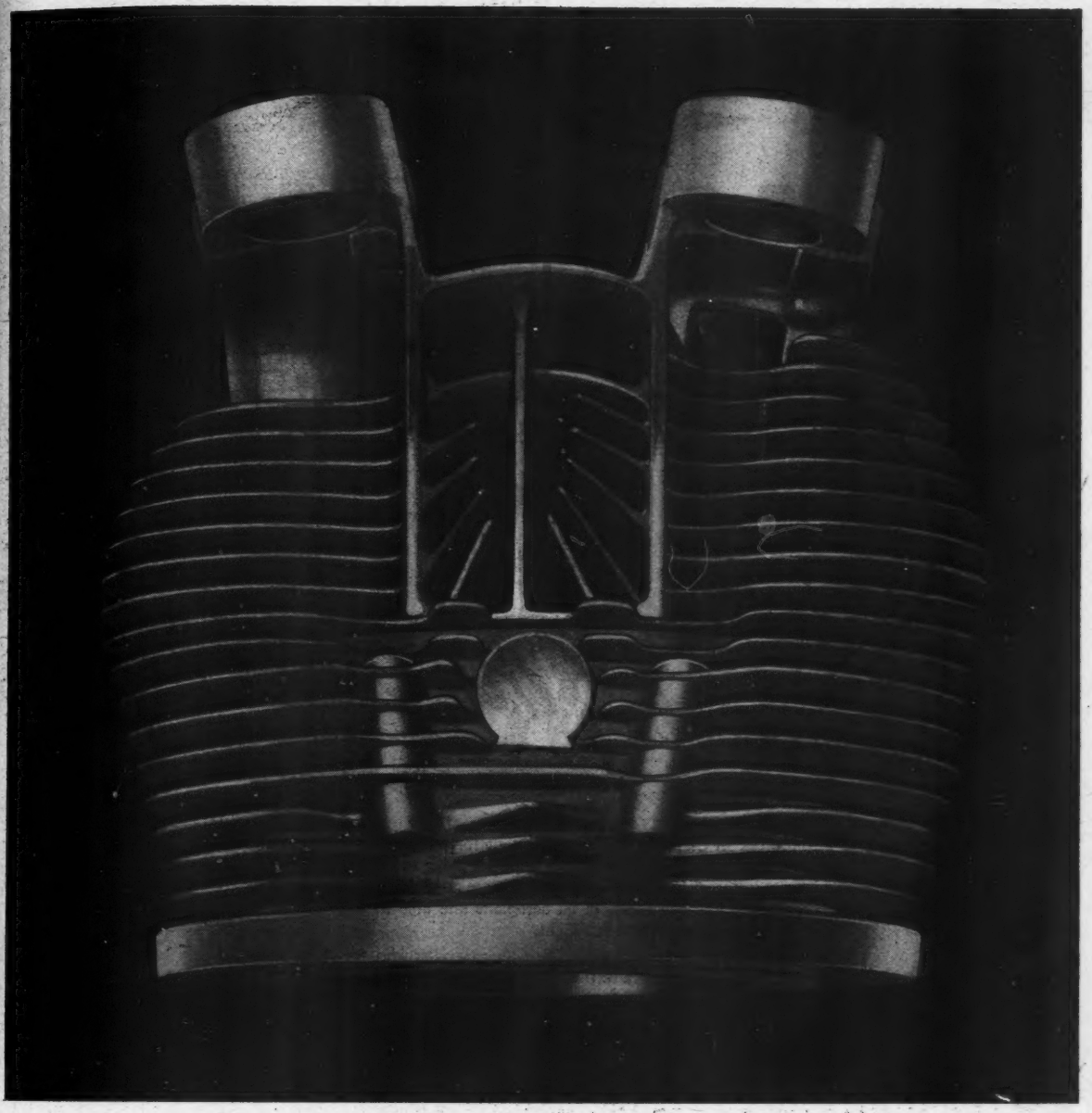

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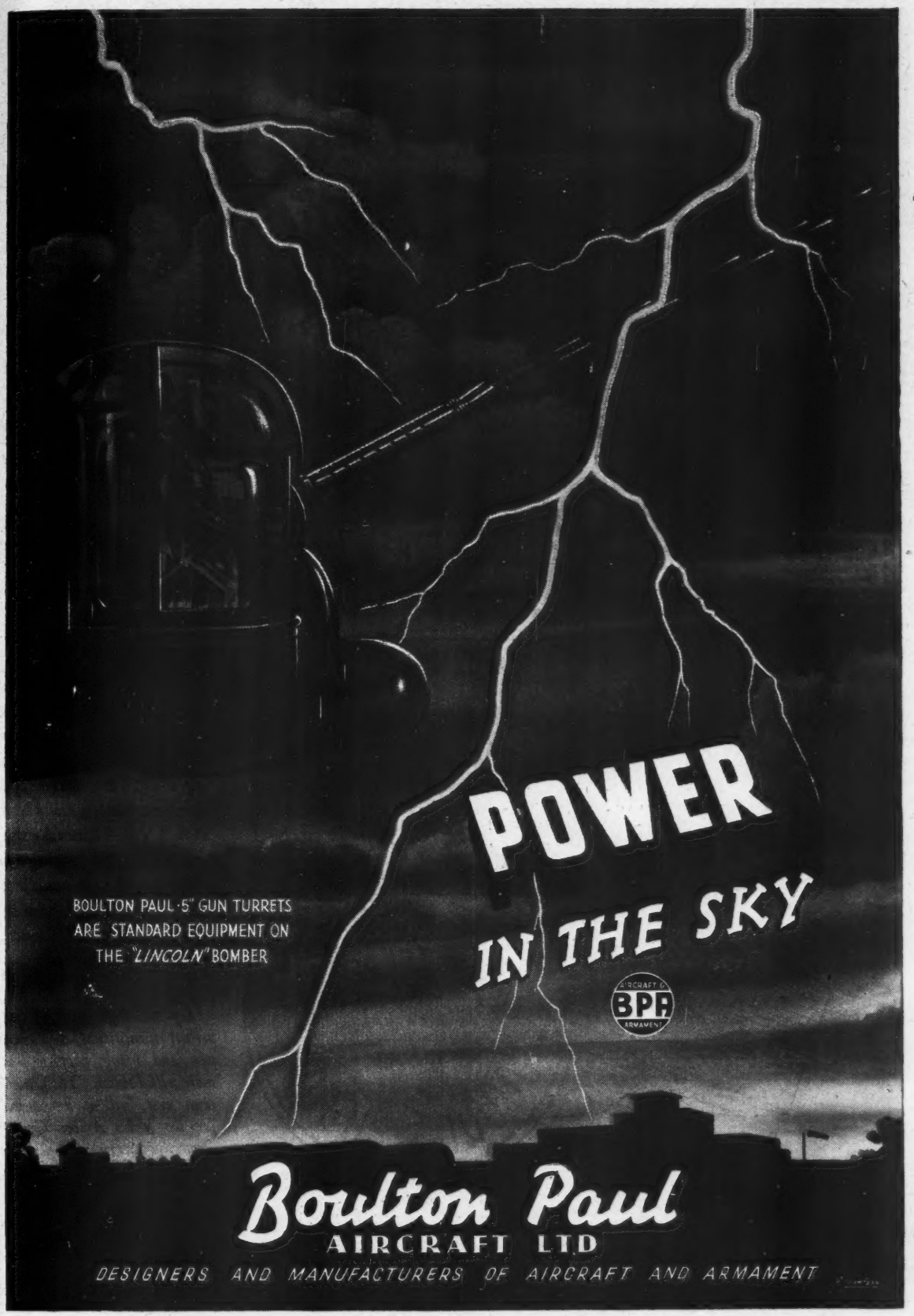
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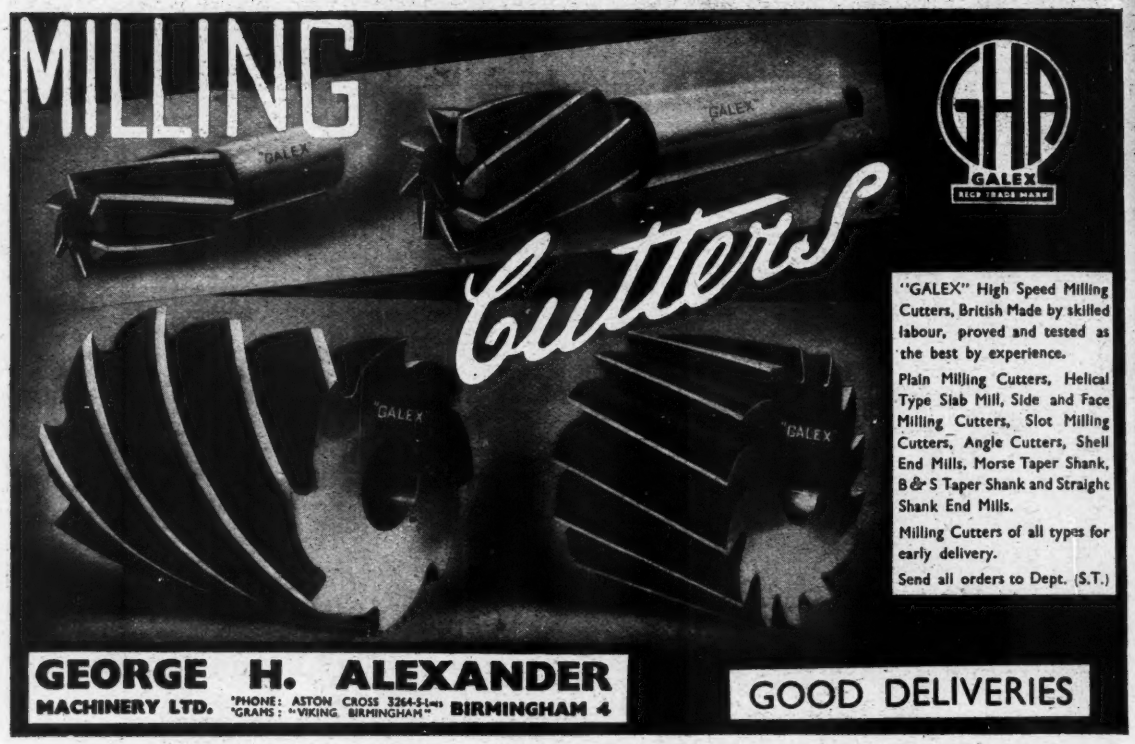
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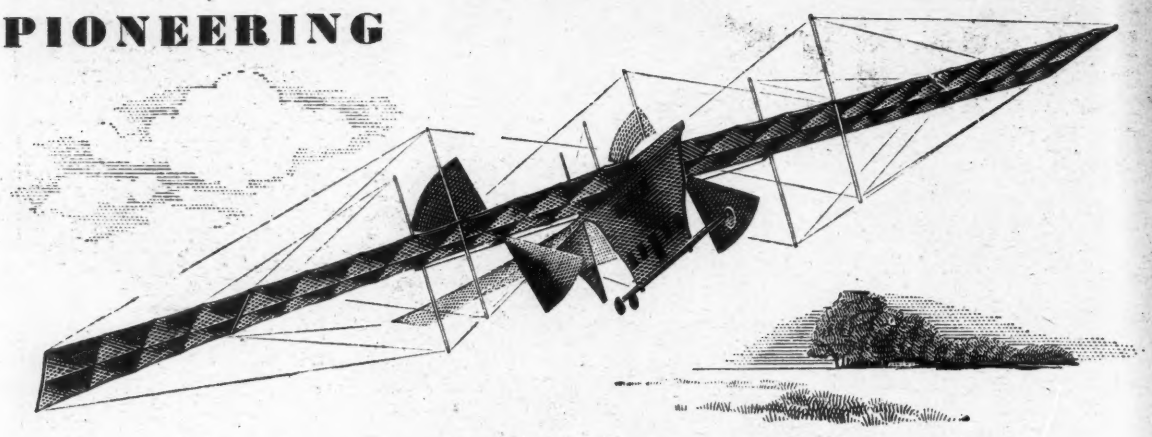

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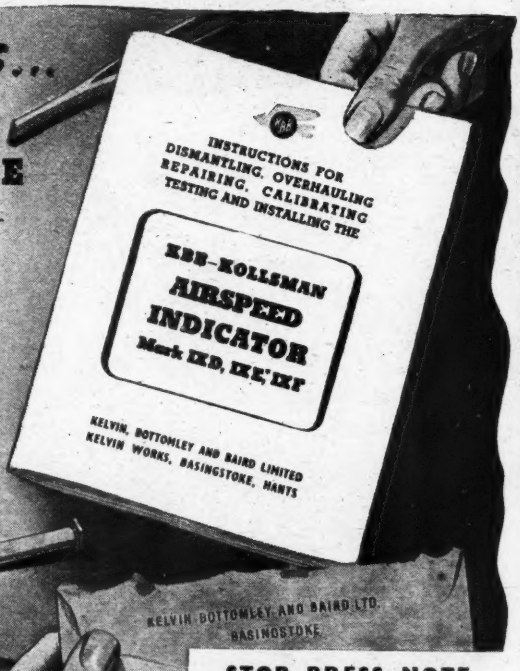
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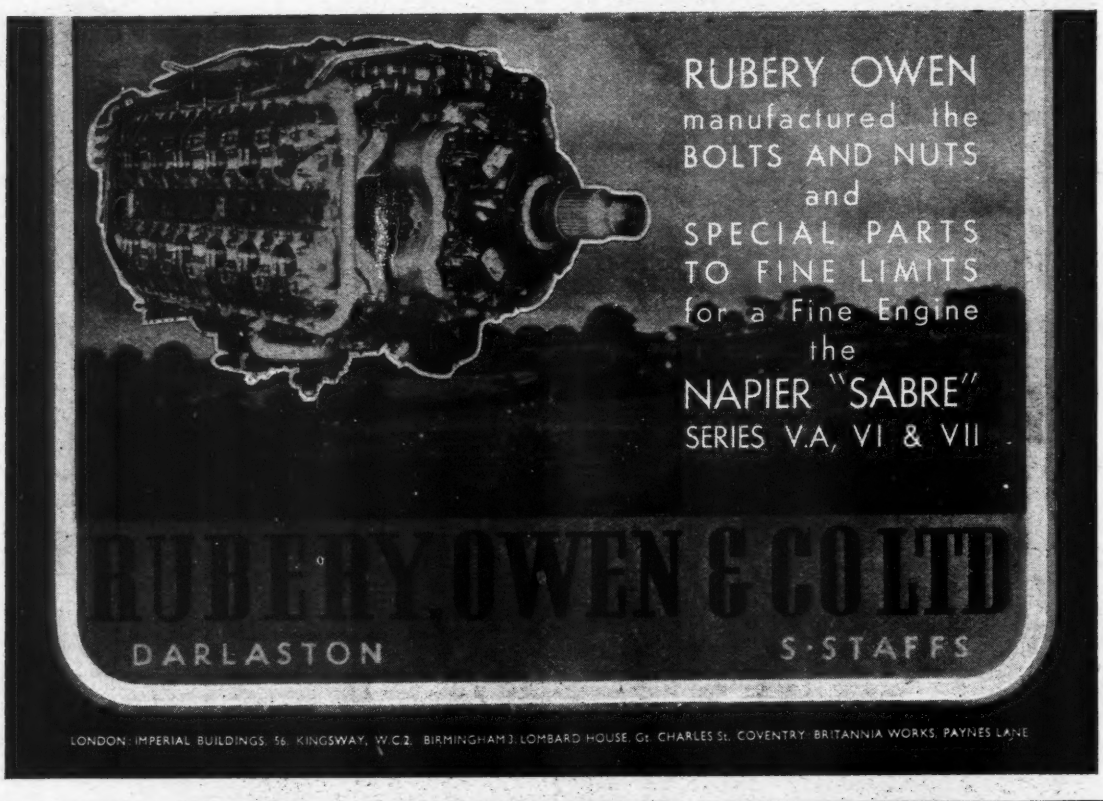

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⅜" "	2 or 3	.600"
7/16" "	3	.710"
½" "	3	.820"
9/16" "	3	.920"
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¾" "	4	1.200"
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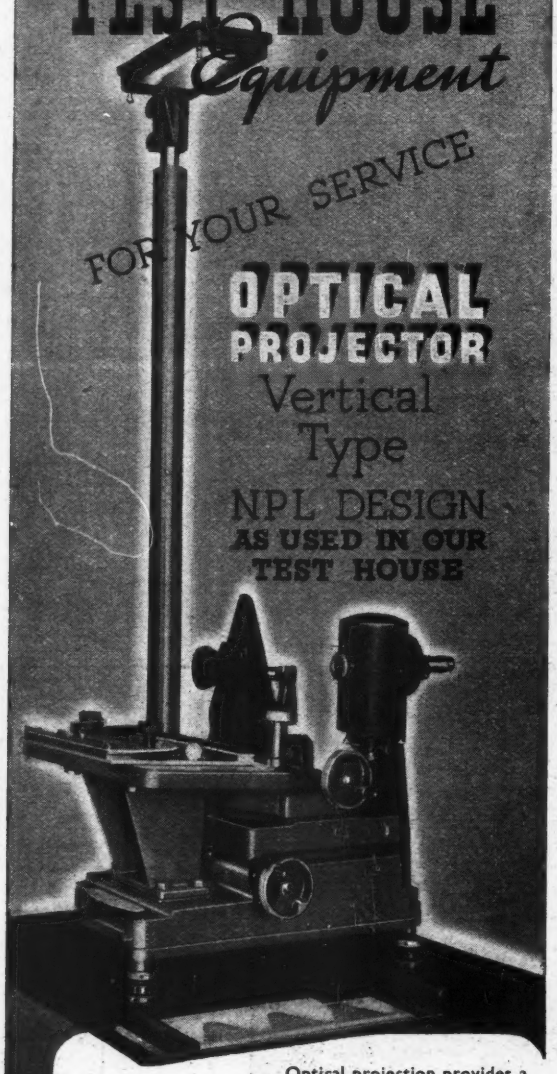

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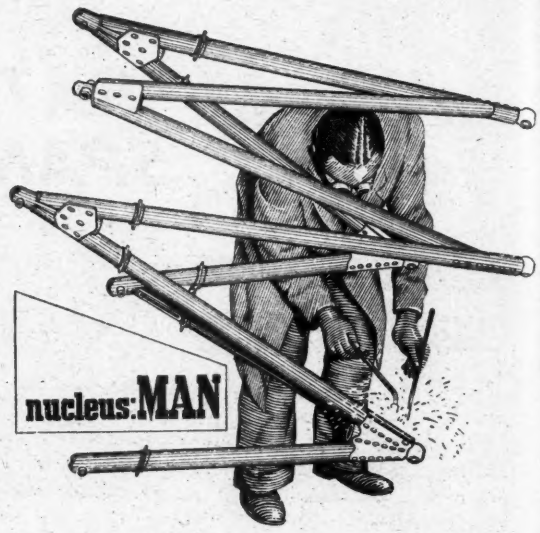

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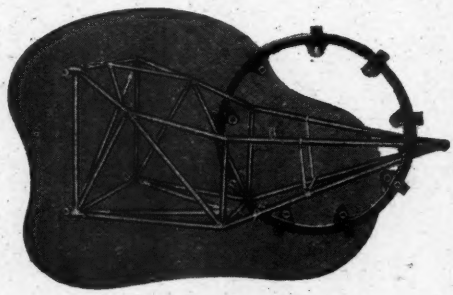

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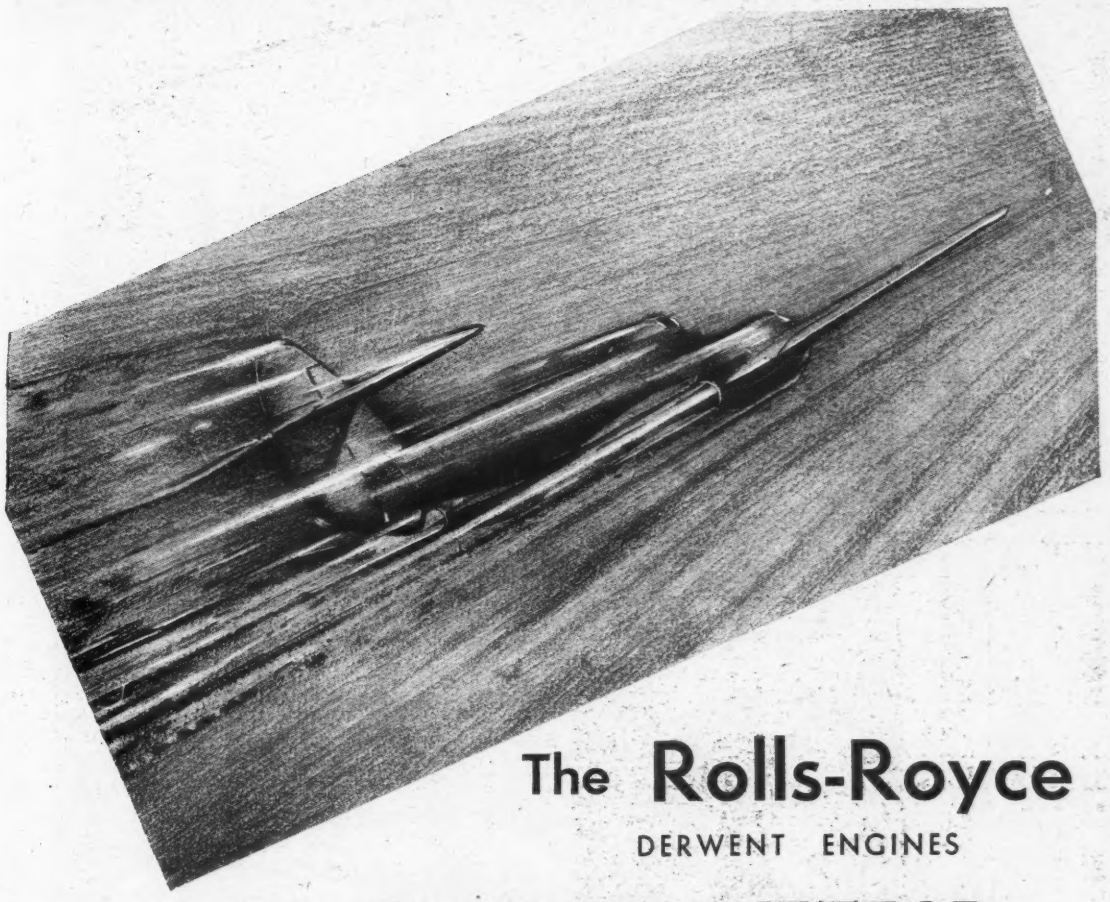

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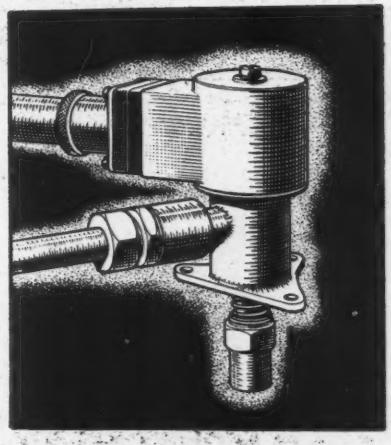

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The Outlook

Controlling the Uncontrollable

NECESSARY though it is to formulate rules and regulations to cover the movements of individual aircraft, we cannot help feeling that the new series of directions designed to this end are primarily the result of a desire to "pass the buck" rather than to clear the air. There is no doubt that the Ministry of Civil Aviation, and even the Air Ministry, has always suffered from what can only be described as a "collision complex." So long as this possibility is properly guarded against, the worthies responsible for the new series of *Notices to Airmen* will no doubt feel able to sleep quietly in their beds.

In fact, of course, the average pilot will still tend to ignore all the words that have been written and to proceed on his or her way while using ordinary common sense—unless personally pulled up by a control officer or other person of authority. The amateur will set off when he thinks he is able to get through, and will fly at a height at which he is best able to cope with the situation—regardless of the regulations. In low cloud and rain he may fly at tree-top level, and in ground haze he may fly at just that height which will allow him to see through it.

The idea of collision will hardly be considered, and this apparent indifference seems to be statistically supported. Except in the immediate vicinity of busy airfields, the danger of collision is negligible, and accidents from this cause have been incredibly rare, even during the war period, when the number of uncontrolled air movements was greater than it has ever been, or likely to be during the next decade. There is certainly need for strict regulations to cover the airfield danger—and not only at busy terminals, where the majority of aircraft are under radio control. In certain conditions of cloud height and visibility many of the orbiting aircraft are flying at same height and at much the same distance from the airfield perimeter.

The most attractive feature of the "new order" is the return of even more adequate meteorological facilities, both at airfields and in broadcast form. The pre-war Borough Hill transmissions were of immense value to the pilot who needed to make a preliminary decision before wasting valuable time in travelling to his airfield.

Casual criticisms apart, the new arrangements are essentially good and show that the Ministry of Civil Aviation has the whole situation well in hand. So long as we are not bombarded with too many long-winded directions—and the more there are, the less likely they are to be read and followed—all will be well. We might almost suggest that the important points could usefully be summarised when the plans are complete.

The New R.A.F. Pay Rates

OTHERS besides Mr. Micawber have discovered the fact that economics govern human existence. Every member of the Fighting Services below commissioned rank is interested in the new rates of pay recently announced by the Government. The salient features have been dealt with by the daily papers, and have undoubtedly been studied with care by sailors, soldiers and airmen. Not every paper, however, has brought out the fact that the White Paper on the subject introduces a new organisation into the Royal Air Force, and abolishes certain anomalies which had grown up in the past.

Summarised briefly, these changes are as follows: There will be fewer officers in aircrews; there will be no direct appointments to short-service commissions from civil life; and there will be a new system of ranks for aircrew airmen. In addition, the number of trade groups among airmen who serve on the ground will be reduced from six to four.

When, in 1912, a committee decided on an organisation for the new Royal Flying Corps with its Naval and Military Wings, the principle was laid down that pilots

should be officers. There does not now seem to have been any valid reason for that decision; but at the time it seemed to simplify matters. One must remember that in those days an aircraft usually carried only one or two persons. The principle did not entirely continue all through the 1914-18 war, and a few sergeant pilots and many "other ranks" air gunners were employed.

With the advent of the big bomber in the second world war the numbers in an aircrew were increased. By that time airmen pilots had become common. One man, almost invariably the pilot, was appointed captain of the aircraft. Very often he was a N.C.O., while one or more of his crew held commissions. While in the air the captain was supreme, and the officers in his crew had to obey his orders. This was a necessary provision, but it produced an anomaly. Incidentally, if the crew landed or had to take to dinghies, the senior officer then naturally took command over all other ranks. All the airmen in an aircrew were N.C.O.s, presumably to give them good pay and prestige. This not infrequently caused difficulties in relation to senior N.C.O.s in ground trades, who were usually older and had much longer service.

"Flying" Ranks

WHEN one comes to consider the matter, the duty of a commissioned officer or a non-commissioned officer is to lead and command, not to do things himself. In single-seater fighters, for instance, airmen pilots deserve great prestige and good pay; but there is no logical reason why they should hold the rank of sergeant, for they command nobody. The White Paper does not mention the case of fighters, but it deals drastically with that of crews in bombers and large flying boats. They will no longer be known as warrant officers, sergeants, etc., but will become and be addressed as Pilot, Navigator, Signaller, Engineer and Gunner. Instead of chevrons, they will wear special badges. The difference in rank will be indicated by five classes, the lowest being Pilot (etc.) IV, and the highest being Master Pilot, etc. These ranks will be related to the well-known ranks in ground trades. A Master Pilot will correspond to Warrant Officer, and Pilot IV to Corporal. These airmen will be eligible for commissions, either permanent or short-service; but the White Paper does not define an officer's position in an aircrew. We should suggest that the captain of an aircraft should usually be an officer, whether he be Master Pilot or Master Navigator.

Permanent commissioned officers will be provided, as in the past, by Cranwell, the universities, and promotions from other ranks. There will still be some short-service commissions; but they will all be provided by promotions from other ranks. That, we consider, is a great improvement; though at present we cannot picture what the future career of the officer will be when his short service comes to an end. Obviously he cannot revert to a non-commissioned rank, and it seems that he will have to leave the Service. He might do better to stick to his old position, as, say, Master Engineer. Pilots and Navigators will in any case be short-service men, as they are to be enlisted from civil life on an engagement of five years' active service and four on the Reserve. Signallers, Engineers and Gunners will be selected from related ground trades, and at the end of five years will normally revert to their trade.

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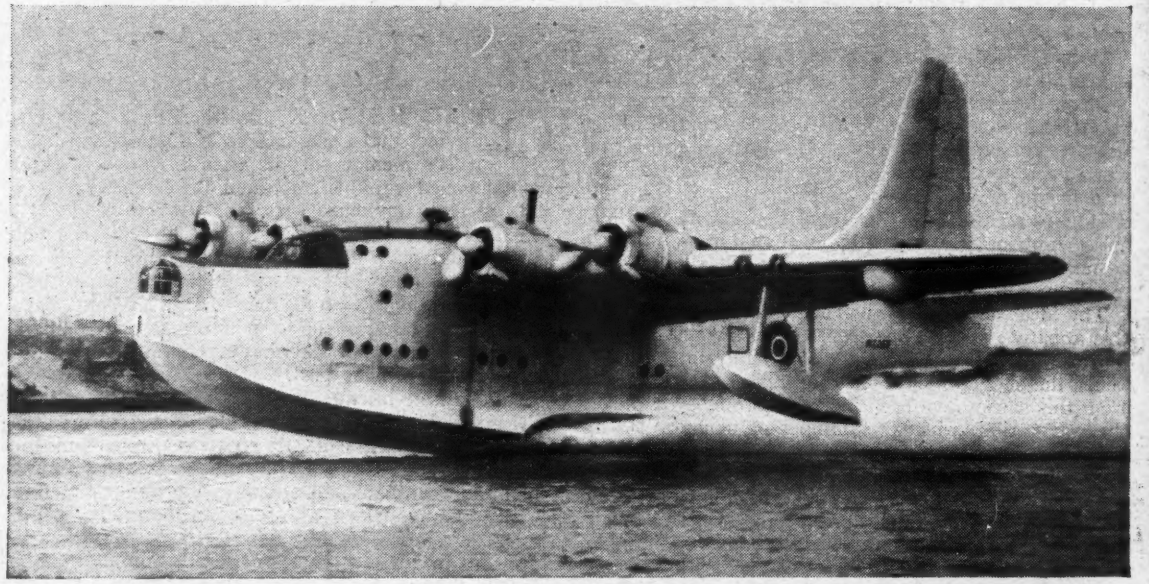


SUNDERLAND REPLACEMENT: The Short Seaford flying boat which scales nearly twice the weight of the original Sunderland. A description of the civil Seaford appears on pages 8 and 9.

1866...AND ALL THAT

The Royal Aeronautical Society Celebrates its 80th Birthday : A Very Remarkable History

By CAPT. J. LAWRENCE PRITCHARD,
Hon. M.I.Ae.S., Hon. F.R.Ae.S.

ON January 12th, 1946, the Royal Aeronautical Society celebrates its 80th birthday. It is the oldest aeronautical society in the world.

It is the fashion for members of a society or an institution to say that the body to which they belong is not as good as it was. The reputation of any engineering society is always higher outside its ranks than in it, and higher still outside its country of origin. That is an odd point, because the reputation of such a body depends, in the long run, upon that of its individual members and their achievements. On that basis alone the Royal Aeronautical Society has every reason to be proud of its long history and of the achievements of its members.

It was an achievement, in any case, to start such an organisation in 1866, and for one of its Members of Council, Wenham, to deliver the first public lecture before the Society in that year on heavier-than-air aircraft—this at a time when there appeared no possibility of such a machine flying in the lifetime of any of those present.

The Council, at their meeting on August 24th, 1866, passed a resolution to form a committee to investigate "the laws of resistance of inclined surfaces moving in elastic and non-elastic fluids, air and water, and the resultant forces obtained at right angles to the direction of motion."

Nearly forty years before an aircraft flew, the Council was approaching the problem of flight in a scientific way and trying to cut away the vast undergrowth of speculation and undirected experiments which had brought only ridicule on all those who had attempted to solve the problem of flight.

In 1868, at the Crystal Palace, the Society held an Aeronautical Exhibition, the first ever staged in this country. No fewer than seventy-seven exhibits were shown, including engines, lighter- and heavier-than-air models, kites and plans of projected machines.

The Society had offered a prize of £100 for the engine with the lowest weight/horse-power ratio, and sixteen engines were entered for the prize. It was won by John Stringfellow with a steam engine for driving his model aircraft. With its boiler, the engine weighed only 13 lb. and developed one horse-power. It took seven minutes to reach its full working pressure of 100 lb./sq. in.

Stringfellow fitted his engine into a model triplane, which embodied many of the constructional features of the aircraft of to-day. The authorities at the Crystal Palace would not allow a free flight within the building and the model had to be suspended from a wire.

"It was seen that after a certain velocity had been obtained," said the Juror's report, "the machine left the support of the wire and rose up."

So good were Stringfellow's models, indeed, that one had flown as early as 1847 when he was carrying out experiments with Henson. But for the lack of suitable light motive power the conquest of the air would have been accomplished many years before it actually was.

The Society held a number of lectures during the run of the exhibition and at one of these Thomas Moy, a powerful advocate of the heavier-than-air machine, drew attention to the importance of speed. "I would advise you," he said in the discussion of one paper, "to think of nothing less than 150 miles per hour, as speed will gain the day and nothing less than that speed." The same sentiments, with a different figure of speed, are being expressed at the Society's meetings nearly eighty years later.

The R.Ae.S., in :—

1868 :	Held an aircraft exhibition.
1870 :	Conducted wind-tunnel experiments.
1872 :	Recognised the existence of boundary-layer problems.
1881 :	Discussed supersonic speeds.
1886 :	Heard a lecture on jet propulsion.

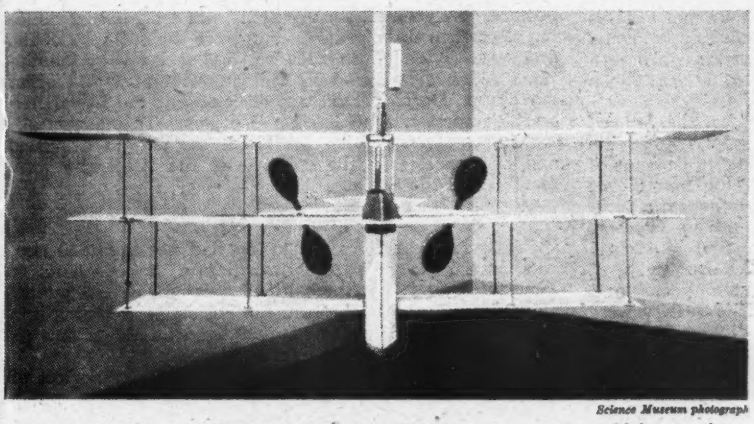
First Wind Tunnel

At that early meeting, too, E. W. Young pointed out that a wing with a curved section would give a better result than a flat plane, and urged the Society to provide "a large fan, capable of producing a current of air of different velocities," to test his suggestion.

Two years later the Council appointed an experimental committee, and under the direction of F. H. Wenham the first wind-tunnel experiments in the world were carried out, and the results published in the Annual Report for 1871. That was a very remarkable achievement.

Many of the problems or forms of construction which are now commonplace were foreseen and talked about at these early meetings of the Society. In 1872, James Glaisher, who was in the chair at one of the lecture meetings, drew attention to the problem of the boundary layer. "The particles of the fluid which come in contact with the plane have somehow or other to get out of the way, by gliding along the surface of the plane, and this produces a complication in the neighbourhood of the surface of such a kind as cannot theoretically be predicted."

At the same meeting Mr. Brooke pointed out the importance of aspect ratio. Three years previously, in



Science Museum photograph

The model triplane into which Stringfellow fitted the steam engine which won the R.Ae.S. £100 prize in 1868.

1866 . . . AND ALL THAT

1869, D. S. Brown, a member, had called attention to the possibilities of aluminium on account of its lightness.

Nowadays we are very much concerned with the speed of sound. In 1881 a member named Scoffern, in a paper read before the Society, drew attention to the rapid increase in the rate of resistance at high speed: " . . . e.g., at a speed exceeding 1,200 feet per second. The speed of sound in air is approximately 1,100 feet per second, and it is now definitely known that as this speed is approached the resistance increases very rapidly."

A Jet Forecast

It is not very easy these days to realise how difficult it was to forecast anything about aircraft, when no aircraft had flown, and no one really knew what kind of thing it would look like when it did fly. Judging by some up-to-date comments on modern machines, some people are still wondering what a *real* aircraft will look like! Nor were there any of those weapons of modern research to help in prediction. What, then, can be more remarkable than Captain Griffiths' lecture before the Society on December 11th, 1886, which had the astonishing title, "Jet Propulsion for Aeronautical Purposes"? Nearly sixty years were to pass before the tiny flame then lighted was to blaze up for all the world to see. Captain Griffiths remarked in his paper, "For a motor there is nothing can be compared to the jet system for simplicity and smallness of volume," and ended, "If we have to look for a lighter motor than this, I believe our case is hopeless."

In 1891 Sir Hiram Maxim joined the Society and described his experiments which came so near success. The following year Horatio Phillips joined and in 1893 described his flying machine which, weighing 402 lb., had lifted itself in the air at a speed of 28 miles per hour over a distance of several hundred feet.

"I think we have now arrived at that stage," wrote Brearey, the honorary Secretary of the Society, "which enables us sufficiently to account for the formation of this Society in 1866, and those who have supported it may now congratulate one another that in some form the end is certain to be attained."

More and more members were taking part in active attempts to fly. Moy, Frost, Brearey, Maxim and Phillips were followed by Percy Pilcher, whose gliding experiments led to the stage of fitting a small motor in 1899, a month or two before his death in a gliding accident.

Capt. J. Lawrence Pritchard the present secretary of the Society

In April, 1904, the *Journal* published a paper by Orville Wright, giving an account of those astonishing four flights made on December 17th, 1903, by himself and his brother. It was the first authentic account in this country.

A few more years and members of the Society were flying themselves. The first two Englishmen to go up in the air in an aircraft—Wilbur Wright was the pilot—were Griffith Brewer and Baden-Powell, who were both to become presidents of the Society. The first Englishman to fly, Lord Brabazon, and the holder of No. 1 Pilot's Certificate, is a past-president of the Society.

"Flight" Photograph.

The imposing entrance and staircase of the Society's premises at No. 4, Hamilton Place.

Verdon-Roe (one of the earliest to fly and the designer of one of the most famous aircraft of the last war, the Avro 504K), S. F. Cody, who won the Military Trials in 1912, Howard Flanders, W. O. Manning, Oswald Short, Alec Ogilvie, Robert Blackburn, Handley Page; these and many other members of the Society were enthusiastically flying and designing or building aircraft in those years from 1909 to the outbreak of the first war. T. O. M. Sopwith was laying down the foundations which culminated in the famous Camel and other machines. De Havilland was designing at the Royal Aircraft Factory, with Folland and others. To mention all, indeed, would be to list nearly all the famous designers and constructors in the country at the time who were members of the Society.

Royal Prefix

For forty years the membership had not exceeded 100, and for the greater part of that time a devoted band of some thirty had kept the spirit of aviation in this country alive. But now, at long last, the Society was coming into its own. In 1918 it was granted the title Royal and its membership had grown to over a thousand.

The slump which followed the war, and the neglect of aviation generally, had its effect on membership, which steadily declined for the next five years. But the inauguration of an examination for Associate Fellowship, the formation of the first branch at Coventry, quickly followed by

SUPREME FOR OCEAN TRAVEL — THE BRITISH FLYING BOAT

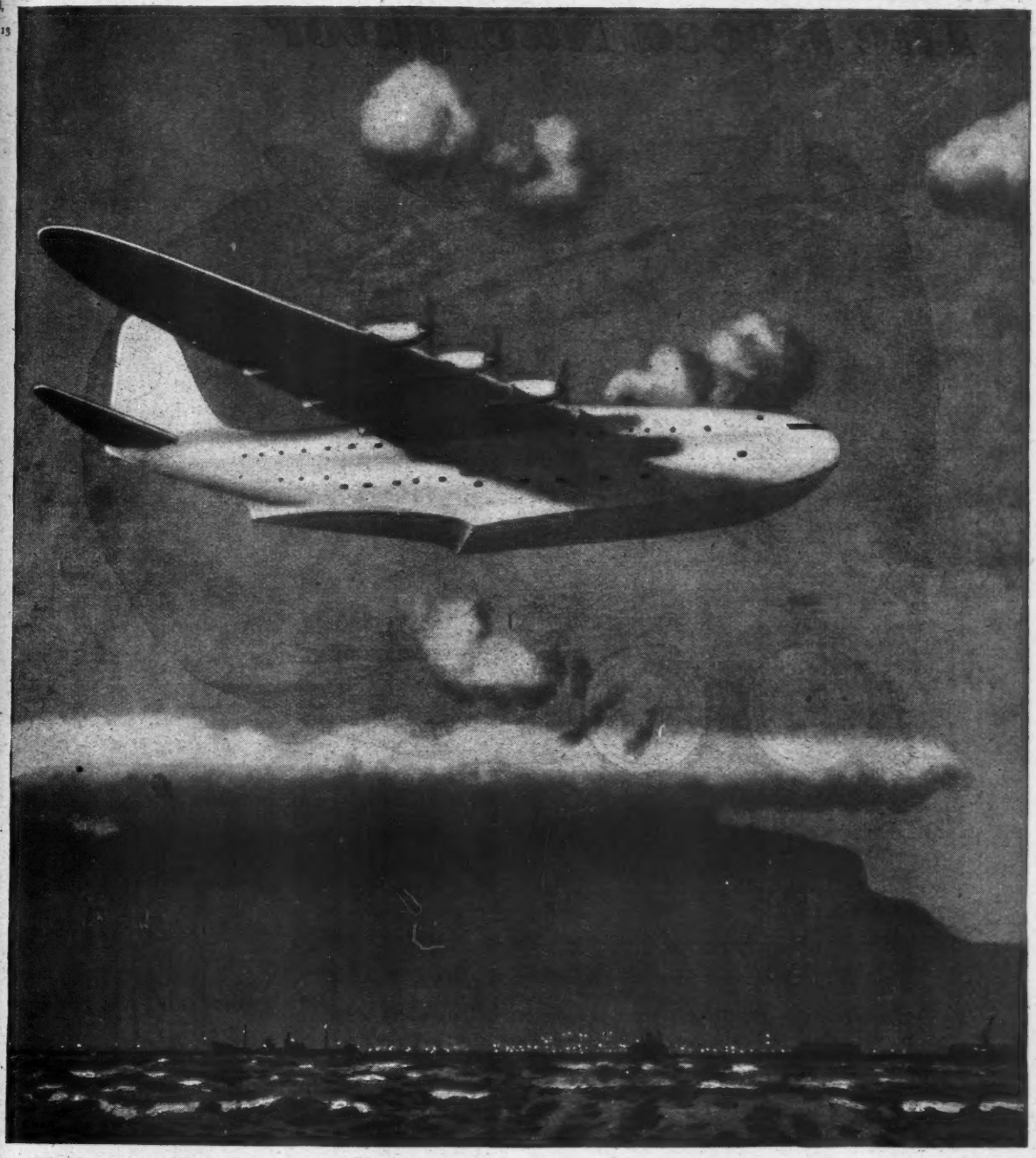


Table Mountain—and a British flying boat of the near future.

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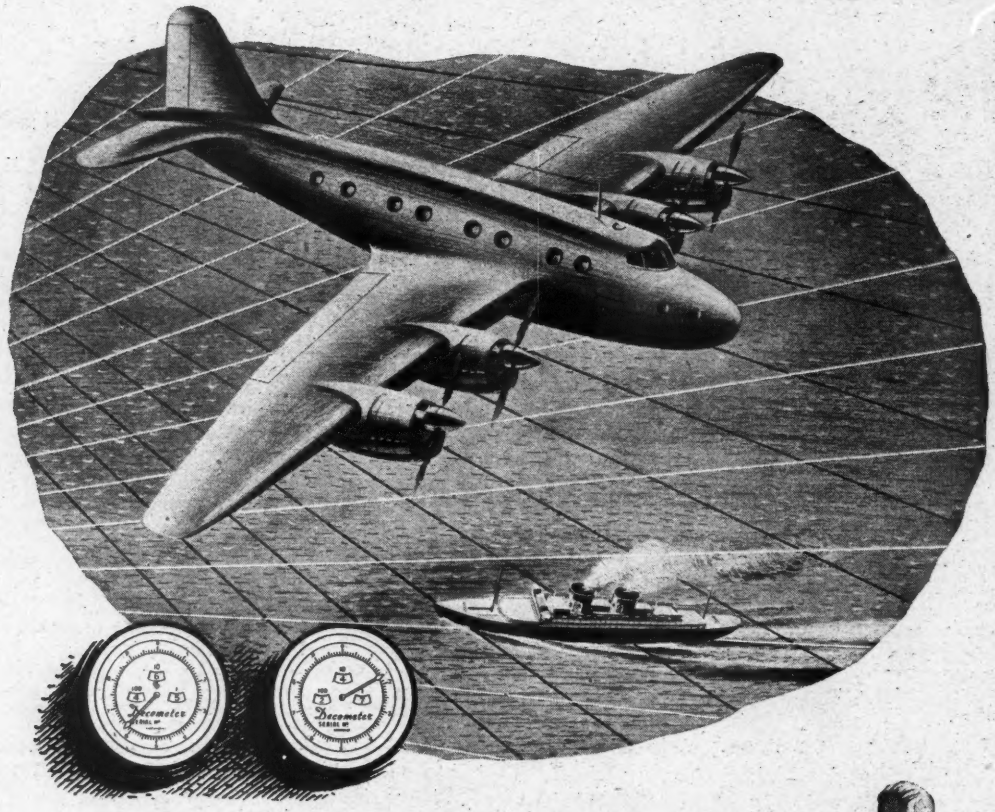
The Decca Navigator



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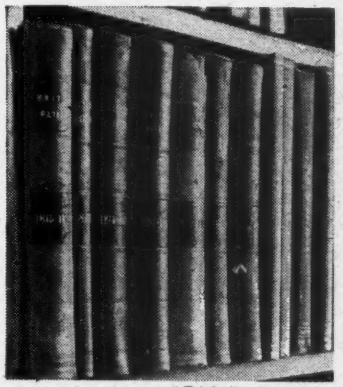
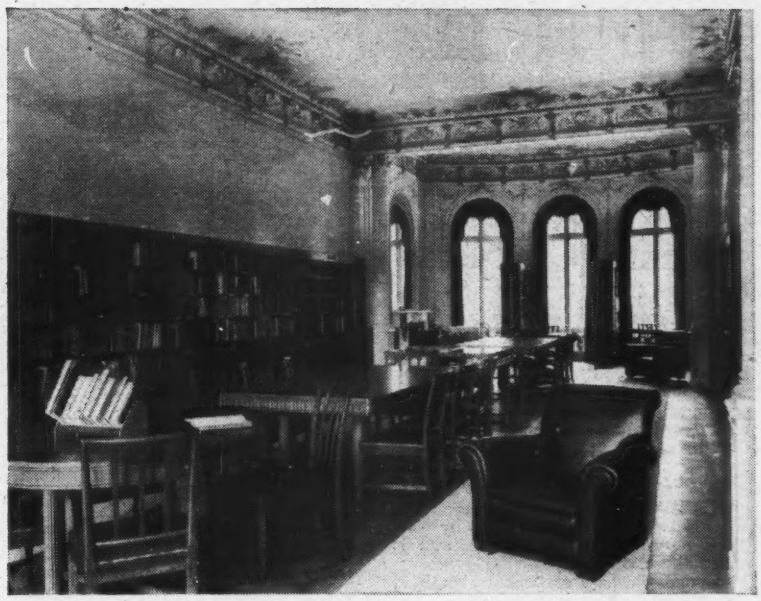
1866...AND ALL THAT



"Flight" photographs.

Records of aeronautical patents as far back as 1815 can be found on the shelves of the Society's spacious library.



others, and the increasing importance of the papers read before the Society, all played their part in making the organisation more widely known, and a rise in membership followed. The figure is now over 5,000, excluding the branch membership, which is about the same number.

For some years before the recent war one of the Society's most popular activities was the annual Flying Garden Party, which attracted many thousands of members and their friends, and enabled constructors to show the latest types of aircraft.

The War Years

In 1939 the Society took over the new headquarters at No. 4, Hamilton Place. The Council had prepared considerable schemes for wider activities, all of which had to be dropped on the outbreak of war. Among them was an International Aeronautical Congress, which was to last a week, and for which many lectures had been arranged.

The Society's premises suffered heavy damage from bombing on seven different occasions, but at no time did it prove necessary to vacate them.

Due to a number of causes, such as secrecy and the censorship, it was not possible to arrange the usual sessions of lectures, although the Wilbur Wright Memorial Lecture was read on its appointed day throughout the war, including that memorable day in May, 1940, when the fall of France was taking place and the invasion of England seemed likely.

A number of secret meetings were held during the war to bring together the fruits of experience of the various R.A.F. Commands and the Fleet Air Arm and the work of designers and producers in the industry. They proved to be the most successful and useful meetings of any in the history of the Society.

A number of secret committees were appointed to which no reference could be made at the time. Two of them, the Stressed Skin Committee and the Aerodynamics Committee, were specially concerned, with the help of the S.B.A.C. and M.A.P., in the issue of data sheets for the industry. These sheets were of such a high standard that a considerable number of sets were asked for by the N.A.C.A. to distribute to the American industry. It is hoped shortly to make these sheets available to all.

One of the interesting side-lines of the work of the Society during the war was the arranging for the Associate Fellowship examinations to be held on board ship, in many centres abroad, and in prisoner of war camps. In the five years more than 600 candidates took the examination.

In recent months the Council have had under consideration an expansion of the Society's activities in many directions. Many of the necessary facilities are still not available, but as they become so the Society hopes to go rapidly along the road which was temporarily blocked by six years of war.

These notes on the Society have necessarily been brief, from sheer considerations of space. But if a familiar old question is asked—"What do members of the Society *do*?"—there is still space for the reply, which is that not one aircraft or aircraft engine designed and built in Great Britain in recent years but has behind it a member of the Society; every British fighter and bomber and reconnaissance and training machine of the war owes its conception to a member of the Society; and every civil aircraft now on the stocks can make the same claim.

The Royal Aeronautical Society has travelled a long and hard road since 1866, but it has been worth it for the bright vision which now lies ahead.

R.A.E. IGNITION RESEARCH

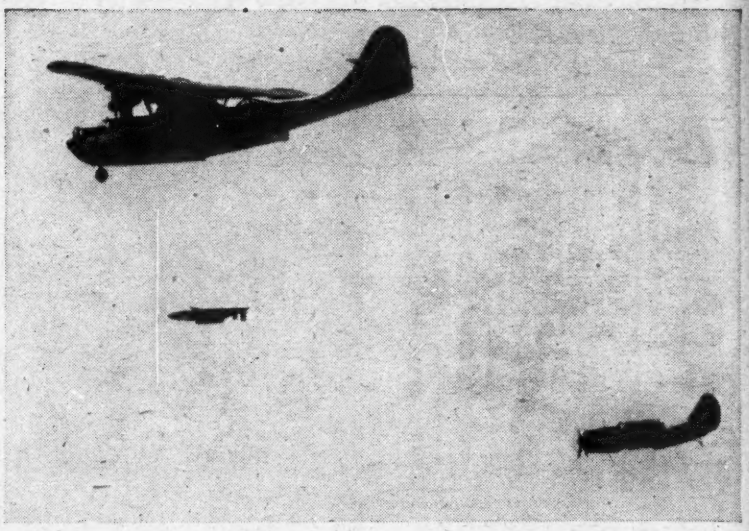
TWO interesting experiments in the ignition field were among the numerous exhibits of aircraft electrical equipment forming the subject of yet another Farnborough exhibition which, organised by M.A.P. and the R.A.E., concluded recently.

One was a high-frequency ignition system designed by the R.A.E. to overcome plug fouling. Used in conjunction with a modified magneto, a compact frequency converter—virtually a conventional W/T spark transmitter—changes the usual 2 Kc. low-frequency-magneto ignition to something of the order of 1 Mc. Demonstrated in comparison with a conventional system, it continued to produce efficient sparking when a resistance was placed in the circuit which could—and did—cause entire failure of ignition by a normal magneto.

The other development was designed to overcome the well-known difficulty of electrical leakage in distributors at high altitudes; such leakages, by bridging insulator surfaces with carbon, may sometimes cause complete ignition failure on descent to a lower altitude.

By a simple and purely mechanical modification of the distributor design, the leakage, when it does take place, expends itself harmlessly over the gap to the "previous" cylinder, i.e., the one which has just fired and which is therefore on the exhaust stroke. Demonstrated in a chamber exhausted to the equivalent pressure height of 35,000ft., the distributor sparked normally; at 45,000ft. leakage began to take place over the designed channel; and it was not until 50,000ft. that random sparking occurred.

HERE AND THERE



THE JET DRONE, KDN-1, used in a demonstration of radio control by the U.S. Navy at Atlantic City, was released from the Catalina and then controlled by the Helldiver. The potentialities are obvious.

Austers Away!

THE first two Auster three-seaters to come off the peacetime production line at Taylorcraft's factory at Rearsby were handed over to their respective purchasers—business men from Birmingham and Nottingham—a few days before Christmas.

For Long Range Patrol

A NEW patrol aircraft for the U.S. Navy has been announced by New York radio quoted by Reuter, and is called the Midwing.

Beyond the bare statement that it is a land-based twin-engined type of some 4,600 h.p. with a range of 5,000 miles, and that it carries a crew of seven, no details have been released at the time of writing—not even the maker's name.

Alvis Aircraft Engine

MENTION that the firm had "designed a 9-cylinder radial aircraft engine of medium horse-power to meet what we believe to be a most urgent post-war requirement," was made in the chairman's statement to shareholders of Alvis, Ltd., at the recent annual general meeting.

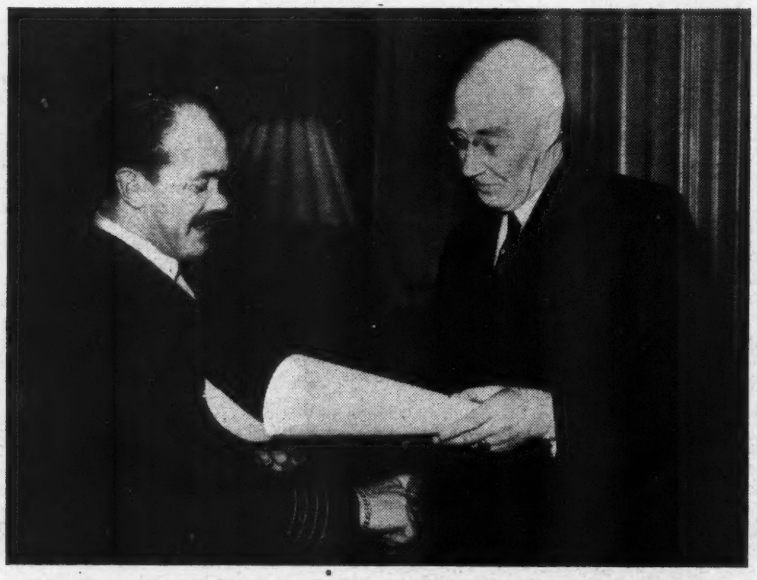
Mr. Nicholson added that it had been decided to put in hand a small number of these engines to meet existing and likely enquiries "for installation in certain civil prototype machines" to be produced during the next 12 months.

It will be remembered that Alvis introduced a range of radial engines before the recent war, one of which was the 9-cylinder Leonides of 450 h.p.

A Celebrated Name

THE Bristol firm of Aero Engines, Ltd., as announced by the chairman, Sir Maurice Bonham Carter, in his speech at the annual general meeting recently, is to change its name to that of Douglas (Kingswood), Ltd., and its post-war programme is centred on the production of Douglas motor cycles, beginning with a 350 c.c. model recently described in *The Motor Cycle*, and the Douglas industrial truck.

During the war, this firm has been engaged in the manufacture of aircraft wings and other units, industrial trucks, and several models of Douglas flat-twin engines (a type synonymous with the name) employed in radar equipment, generating sets and other war purposes.



RECORD POSTSCRIPT: During an informal party at the Royal Aero Club on December 19th, a certificate of performance was presented to Group Capt. H. J. Wilson, A.F.C., the air speed record holder, by Lord Gorell, chairman of the club. Among many other well-known aviation people present was Marshal of the R.A.F. Sir Arthur Tedder, G.C.B.

Airworthiness Requirements

THE Air Registration Board announce the issue of eleven additional sub-sections to *British Civil Airworthiness Requirements*. Numbered A.24 to A.27 and C.1 to C.7, these deal mainly with tests of piston engines.

B.C.A. Requirements and amendments are obtainable at a price of £2 2s. for the complete series (half-price to licensed ground engineers) from the Air Registration Board at Brettenham House, Lancaster Place, Strand, London, W.C.2.

Christmas Ambiguity

THE rush inseparable from going to press with our December 27th issue before the Christmas holidays must be held responsible for the somewhat ambiguous wording of the inscription under a diagram on page 672, which may have given the impression that the diagram represented a Halford H.1 jet engine.

Actually, of course, it showed a "straight-through" combustion system on engines with double-sided impellers. The Halford uses a single-sided one, which does away with the need for a central bearing.

To Teach Administration

WITH the object of formulating and expounding the basic principles and technique of organisation, administration, and leadership, there is shortly to be established the Administrative Staff College for which a suitable site outside London is at present being considered.

The students will be young civil servants, trades union officials, and business men who will work together in teams on typical modern problems and

VIP

Flying Conference Room

The illustration shows a typical Rumbold idea—the flying conference room for use in flight or on the ground. In an aircraft so equipped, there would also be state-rooms, smoke-room, galley and full toilet facilities.

In war, air transport has been the servant of Statesmanship. In the new era of peace, Commerce will follow the example set by those who brought victory to the Allied Arms. Men on whom reconstruction depends will accomplish their tasks quicker, more surely, by using the air—modern means of travel.

Rumbold, acknowledged world-authority on comfort engineering is ready with schemes for the furnishing, decoration and equipment of the aircraft which will carry the leaders of Industry and Trade smoothly and quickly on their peaceful pursuits to the ends of the Earth.

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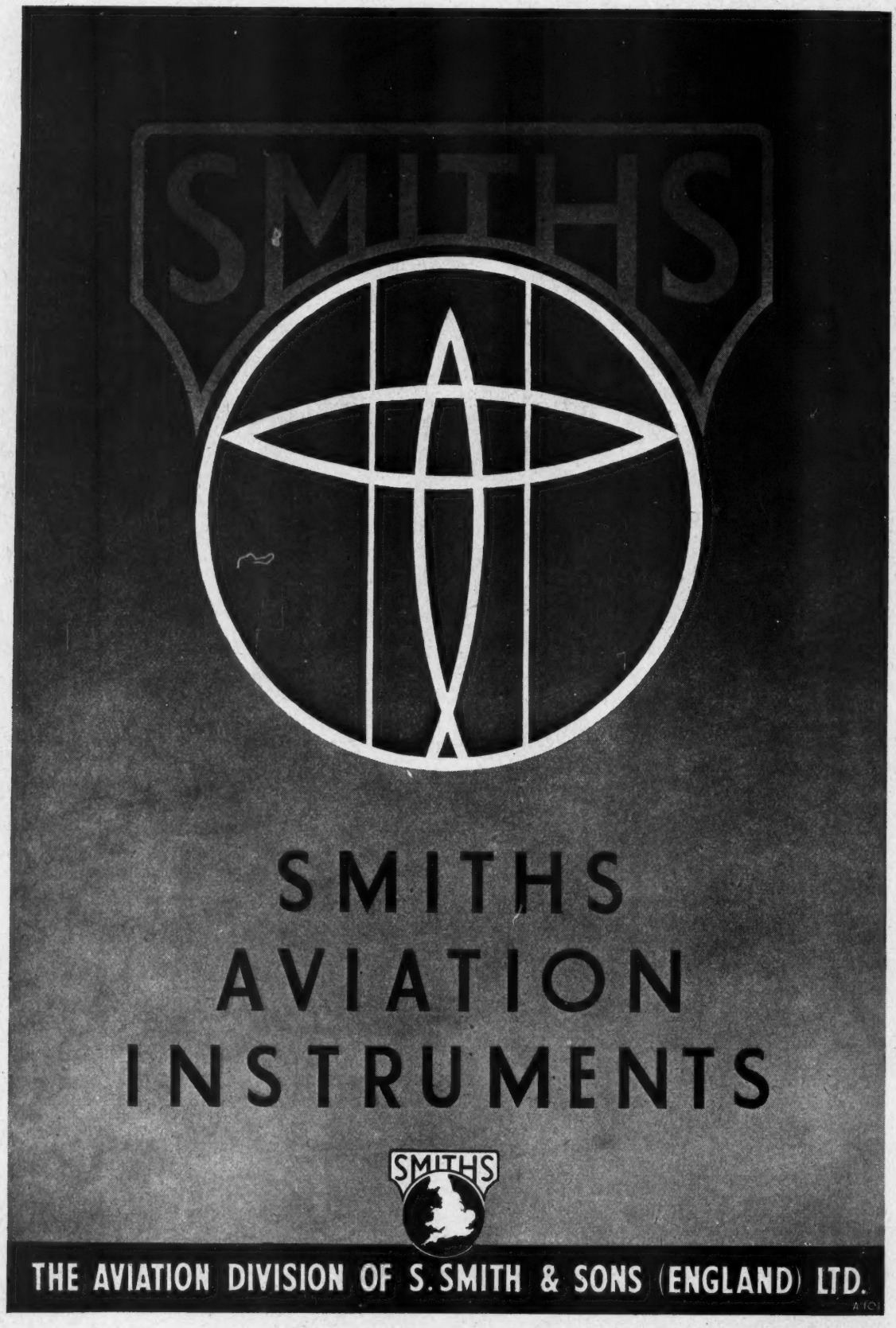
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HERE AND THERE

will thus pool their ideas and experiences to mutual advantage.

The proposed college is the result of four years' study by a group of leading industrialists and public servants and is to be a non-profit-making concern under the financial control of a Court of Governors headed by Mr. Geoffrey Heyworth, chairman of the Lever enterprises.

Feline Fighter

DETAILS have been released of the latest addition to the Grumman "Cat" series of fighters—the F8F Bearcat. Photographs show it to bear a strong family resemblance to the Hellcat.

The Bearcat is powered by a 2,100 h.p. Pratt and Whitney engine, and the usual modest claim in the transatlantic Press is that its climb, speed and manœuvrability "excel all fighter 'planes in all Services."

Civil Heathrow

BY way of a New Year present the Air Ministry has handed over Heathrow airfield to the Ministry of Civil Aviation. Since the latter will, in due course, be responsible for the development and equipment of the airfield, it was only reasonable that this move should be made.

At a recent Press conference Mr. Ivor Thomas said that two runways would be ready for use before the end of February; one is already clear.

The honour of making the first official civil flight from Heathrow fell to Air Vice-Marshal D. C. T. Bennett, now with British South American Airways, who chose the airport for the start of a series of proving flights to Buenos Aires in a Lancastrian.

A PRINCE'S PLANE. This Siebel Si 204 light transport type was used by Prince Bernhard of the Netherlands when he paid a recent visit to Air Chief Marshal Sir Sholto Douglas, A.O.C.-in-C., B.A.F.O., in Germany.

Promotion

BILL HUMBLE has been appointed chief test pilot to Hawker Aircraft, Ltd., in succession to Phillip Lucas who joined the company's board some six months ago.

Bill first joined Hawkers on October 10th, 1940. He has been engaged almost entirely on development work since then, and took a very active part in the perfection of the Typhoon, Tempest and Fury.

He learnt to fly in 1929 in the Special Reserve, A.A.F., was one of the original pilots of No. 504 Special Reserve Squadron, a founder-pilot of No. 609 Squadron, and was later on the Reserve of Air Force Officers.

Son of a coal-owner, Bill Humble qualified as a mining engineer in 1930, but he was best known to the general public as a King's Cup pilot, having competed on several occasions in his own aircraft.

Not Quite So Far

IN *Flight* of December 13th there appeared, under the heading of "The Fuller Life," an item about the Aberdeen University Squadron in which it was stated that flying training is to be given to cadets "up to the 'wings' standard." This should have read "up to the solo standard," as each cadet receives 15 hr. dual instruction during his two years' membership. The same training facilities are provided in all seventeen University squadrons in Great Britain.

New Year Honours

Decorations for Aircraft Designers and Atomic Research Scientists

THE following names appear in the New Year Honours list issued just as we go to Press:—

Mr. Winston Churchill—Order of Merit.

Lord Portal—Order of Merit and Viscount.

Atomic Bomb Research Personnel:—W. A. Akers, Director of Research—Knighthood. Dr. R. E. Peieres, scientific consultant—C.B.E.; Dr. F. E. Simon, reader in thermodynamics at Oxford—C.B.E.

Dr. Benny Lockspeiser, F.R.Ae.S., Director of Scientific Research at M.A.P., Cdr. E. R. Micklen, C.B.E., R.N., deputy chairman of Vickers-Armstrongs, and B. T. Rumble, hon. sec. and treas. R.A.F. Benevolent Fund—Knighthoods.

G.C.B.—Air Chief Marshal Sir William Sholto Douglas, K.C.B., M.C., D.F.C., R.A.F., and Air Chief Marshal Sir E. R. Ludlow-Hewitt, G.B.E., K.C.B., C.M.G., D.S.O., M.C., A.D.C., R.A.F. (Ret.).

K.C.B.—Air Vice-Marshal A. Lees, C.B., C.B.E., D.S.O., A.F.C., R.A.F., and Acting Air Vice-Marshal J. W. Cordingley, C.B., C.B.E., R.A.F.

G.C.I.B.—Flt. Lt. the Maharaja of Mayureganj.

G.B.E. (Knights Grand Cross).—Air Marshal Sir D. C. Strathern Evill, K.C.B. D.F.C., A.F.C., R.A.F., and Sir H. G. Howitt, D.S.O., M.C., F.C.A., J.B., D.L., member of the Air Council since 1939.

K.B.E.—Air Marshal Sir A. Coningham, K.C.B., D.S.O., M.C., D.F.C., A.F.C., R.A.F.; Acting Air Marshal H. E. P. Wigglesworth, C.B., C.B.E., D.S.C., R.A.F.; Air Vice-Marshal J. H. D'Albiac, C.B., D.S.O., R.A.F.; Air Vice-Marshal W. F. Dickson, C.B., C.B.E., D.S.O., A.F.C., R.A.F.; Air Vice-Marshal W. Elliot, C.B., C.B.E., D.F.C., R.A.F.; Air Vice-Marshal T. W. Elmhirst, C.B., C.B.E., A.F.C., R.A.F.; Air Vice-Marshal E. W. Havers, C.B., C.B.E., R.A.F.; Air Vice-Marshal A. S. Morris, C.B.E., R.A.F.; Air Vice-Marshal A. P. M. Sanders, C.B., C.B.E., R.A.F.; Air Vice-Marshal E. A. B. Rice, C.B., C.B.E., M.C., R.A.F.; Acting Air Vice-Marshal S. Cade, C.B., F.R.C.S., M.R.C.P., R.A.F.V.R.; Acting Air Vice-Marshal C. P. Symonds, C.B., M.D., F.R.C.P., R.A.F.V.R.; J. H. Barnes, Deputy Under Secretary of State, Air Ministry; Sir John Robert Renwick, Bt., lately Controller of Communications, Air Ministry, and of Communications Equipment R.A.F.

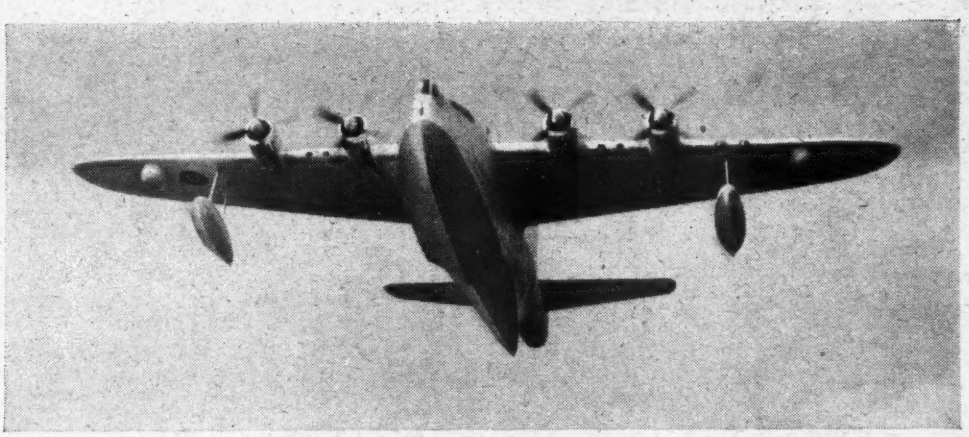
Companions of the Order of the Bath.—Acting Air Comdre. E. H. Fielden, C.V.O., D.F.C., A.F.C., R.A.F.; Professor Solly Jackerman, C.B., Scientific Director R.A.F. Bombing Analysis Unit; R. V. Jones, Associate Director of Intelligence (Science) Air Ministry.

Companion of the Star of India.—Air Comdre. (Acting A.V-M.) M. Thomas, C.B.E., D.F.C., A.F.C., A.O.C. Royal Indian Air Force.

C.B.E.—Lt. Col. S. Bell, A.F.C., i/c Equipment Divisions and R.A.F. liaison officer to Ensa; W. W. Barkett, O.B.E., M.C., Assistant Secretary, Ministry of Civil Aviation; P. Ochen, M.B.E., Deputy Director of Accounts, Air Ministry; R. Corless, O.B.E., Assistant Director of Met. Office, Air Ministry; R. W. Hammond, resident director, airframe factories, Rootes Securities Ltd.; Grp. Capt. E. M. Jones, Foreign Office; G. W. Lacey, A.R.I.C., lately Controller of Light Metals, M.A.P.; Joseph Smith, Chief Designer, Supermarine Works, Vickers-Armstrongs Ltd.; G. R. Volkert, Chief Designer, Handley Page, Ltd.; C. E. Wrangham, lately principal officer for aircraft equipment at M.A.P.; Acting Air Comdre. D. F. W. Atcherley, D.S.O., D.F.C., A.F.C., R.A.F.; Grp. Capt. F. C. Daubney, R.A.F.; The Rev. R. F. Diggle, M.C., R.A.F.

O.B.E.—Acting Grp. Capt. the Viscount Acheson, R.A.F.; Acting Wing Cdr. Sir Richard B. Graham, R.A.F.V.R.; Wing Cdr. G. H. W. Selby-Lowndes, A.F.C., R.A.F.; Acting Sqn. Ldr. E. O. Roberts, M.P. for Merioneth, R.A.F.

Short Seaford

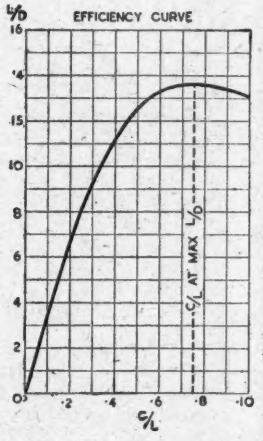


Comparison of this military version with the G.A. drawings of the civil boat will show the handsome lines unmarred by turrets, etc.

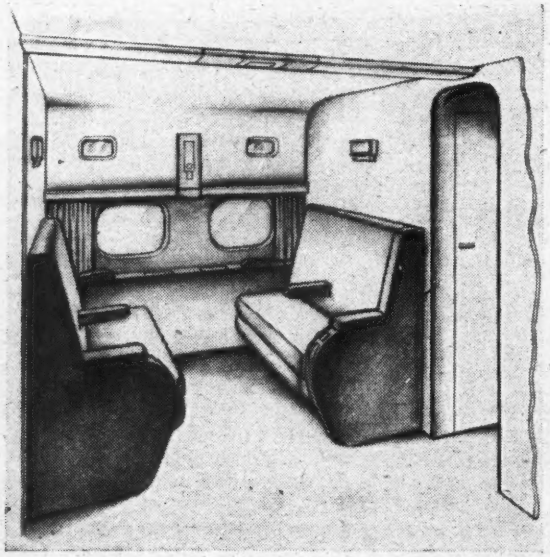
Civil Development of Sunderland With Good Economic Performance

WHEN dealing with the subject of present-day civil aviation one more often than not encounters the contention that a civil adaptation of a military aircraft is a very poor effort in comparison with a machine designed from scratch as a civil job. That there are considerable grounds for the acceptance of this view cannot be denied; but it should not be accepted wholly and without specific consideration—there may well be background influences that can occasion a reversal of the view. For instance, in the case of Short Bros.' latest flying boat, the Seaford, it is distinctly advantageous, as well as fair, to examine its antecedents.

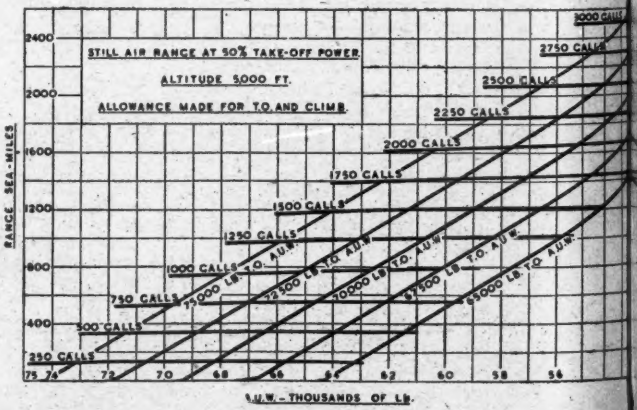
In 1936 the "Empire" class flying boats were introduced and brought an entirely new standard of luxury and reliability to air travel. They did yeoman service on the Empire routes of Imperial Airways and were developed into the "C" class boats which, fitted with Bristol Perseus engines in place of the Pegasus used in the Empire boats, had their all-up weight increased from 40,500 lb. to 55,000 lb.

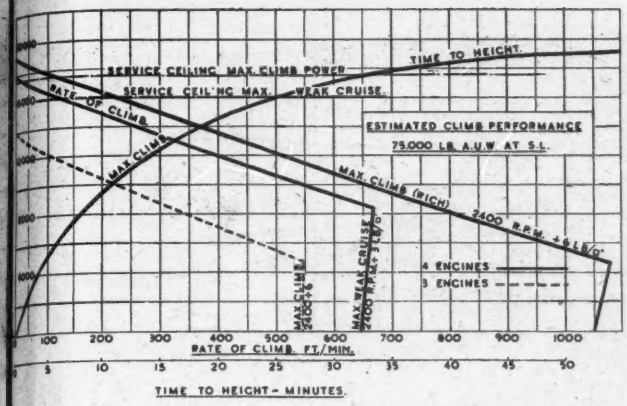


The "C" class boats in turn led to the development of the larger and finer "G" class which could justifiably lay claim to being the very acme of civil airliners in the years immediately preceding the war. It is no small tribute to the quality of Short boats that several of the "C" class are still giving excellent service with B.O.A.C. and, in fact, as already mentioned in this journal, *Canopus*, the "C"



Day arrangement of starboard part of a cabin. This should be regarded in conjunction with the night arrangement




SERVICE CEILING MAX. CLIMB POWER
TIME TO HEIGHT
SERVICE CEILING MAX. WEAK CRUISE.
RATE OF CLIMB
ESTIMATED CLIMB PERFORMANCE
75,000 LB. A.U.W. AT S.L.
MAX. CLIMB
MAX. CLIMB (RICH) 2400 R.P.M. +6 LB/SQ"
MAX. CLIMB 2400 R.P.M. +3 LB/SQ"
MAX. WEAK CRUISE 2400 R.P.M. +3 LB/SQ"
4 ENGINES
3 ENGINES
RATE OF CLIMB. FT./MIN.
TIME TO HEIGHT - MINUTES.

class flagship, recently celebrated her two-millionth flying mile—equivalent to 14,000 hours in the air.

Further, it may not be generally realised that the Sunderland was originally a military development of the "Empire" boat, although we cannot imagine readers of *Flight* being unaware of the Sunderland's magnificent fighting record with Coastal Command and with the Indian Ocean Air Force of Eastern Air Command, apart from its equally fine record in the hands of Transport Command.

Modern Adaptation

When regarding the new Seaford, therefore, one must bear in mind its ancestry, and this would alone give the aircraft a right to a place in the sun, for probably no other in the world is the result of such a long and successful line of basically similar types.

The fact that the Seaford is an adaptation—albeit a refined and modernised adaptation—of the Sunderland

SHORT SEAFORD DATA

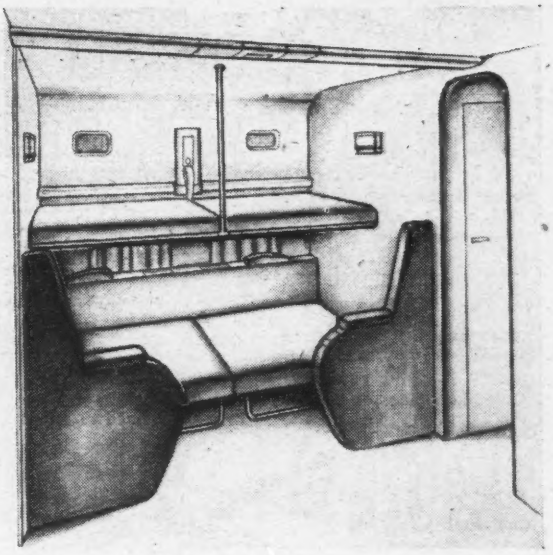
Span	**112ft. 9½in.**
Aspect ratio	**7.53.**
Wing area	**1,687 sq. ft.**
Wing loading (max.)	**44.5 lb./sq. ft.**
All-up weight	**75,000 lb.**

Engine Conditions	R.P.M.	Boost lb./sq. in.	Altitude ft.	B.H.P. per Eng.	T.A.S. knots 75,000 lb.	T.A.S. knots 60,000 lb.
All-out level (5 min.)	2,800	+7	7,000	1,775	236	240
Max. cont. power...	2,400	+6	4,600	1,550	218	223
Max. cont. W.M. power	2,400	+3	8,300	1,280	206	213

Still Air Ranges and Payloads.
(Operating altitude 5,000ft.)
Case A=24 passengers+baggage+ 1,909 lb. freight.
Case B=36 passengers+baggage+ 5,000 lb. freight.
Case C=24 passengers+baggage+14,600 lb. freight.

Loading Case	1,000 B.H.P. Constant Power (80 per cent. Max. W.M.) A-U.W. lb. T-O	A-U.W. lb. Land	Fuel, gall. Petrol	Fuel, gall. Oil	Mean T.A.S. knots	Duration. Hrs.	Still Air Range. Naut. miles
A	75,000	55,765	2,600	100	181	11.0	1,965
B	75,000	60,630	1,941	90	179	8.1	1,440
C	75,000	66,830	1,103	60	177	4.5	785
	(837.5 B.H.P. (50 per cent. T-O power.)						
A	75,000	55,740	2,600	100	165.5	13.25	2,175
B	75,000	60,615	1,941	90	162.5	9.95	1,600
C	75,000	66,820	1,103	60	160.5	5.55	875

Max. Petrol Tankage=3,190 gall.



Night arrangement of starboard half cabin, showing how chair seats and backrests are made up into berths.

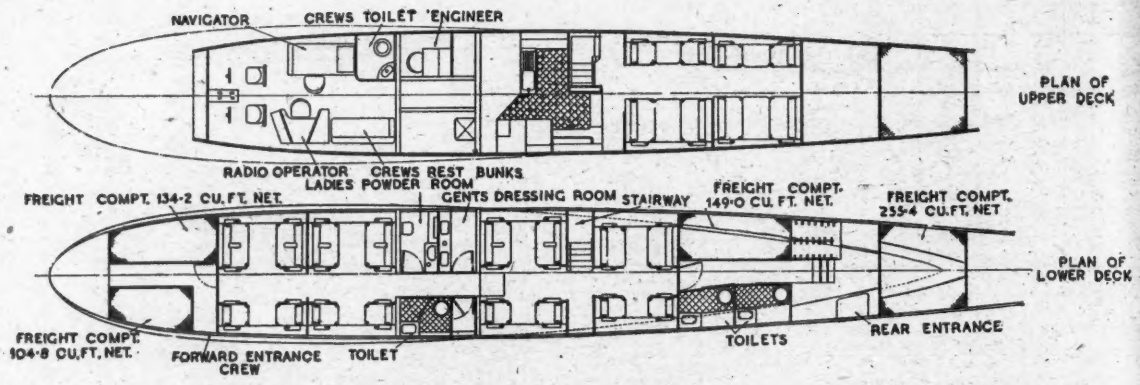
should be made clear, and although it is primarily a civil boat, there is also a military version. Thus, with the civil adaptation of the Sunderland, there are four distinct versions: (i) the Sunderland; (ii) the civil Sunderland; (iii) the military Seaford, and (iv) the civil Seaford. The civil Sunderland is nothing much more than a military boat *sans* military equipment, and with seats and furnishings in its place. Conversely, the civil Seaford is a commercial aircraft on basically similar lines to the Sunderland, and the military Seaford thus becomes something of a successor to the Sunderland.

We are, however, concerned here only with the civil model of the Seaford, and although the only illustrations at present available of actual machines are of the military boat, the effect of deleting the gun turrets, etc., can readily be appreciated by a comparison with the G.A. drawings. The cabin plans will, in addition, make clear the ingenious interior planning which so effectively makes use of all the hull volume whilst, at the same time, ensuring a valuable impression of spaciousness and a high order of comfort.

Internal Planning

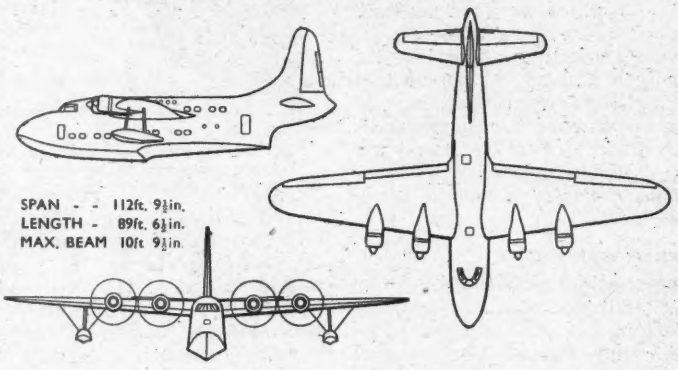
The addition of 3ft. 3in. to the forebody length over that of the Sunderland, and the extra headroom on the after upper deck, have materially assisted in the utilisation of hull space. Provision can be made either for accommodation of 24 passengers day and night, or, alternatively, 36 day passengers, as the six well-appointed cabins—four on the lower deck and two on the upper deck aft—are each capable of seating six or sleeping four. However, when operating the aircraft with 24 day and night passengers, the four lower deck cabins will be used for the normal daytime seating, so permitting the upper deck accommodation to be employed as a lounge and dining room, access to which is by a midship staircase running athwartships.

Each cabin has large-area, non-inflammable plastic windows which serve the dual purposes of providing ample natural light in the cabin and giving the passengers a really excellent view from each seat position—the latter quality, although of great importance as a factor influencing an aircraft's passenger appeal,



These deck plans of the interior layout illustrate the excellent way in which the accommodation of the Seaford has been planned to afford the maximum utilisation.

SHORT SEAFORD



is not very common among modern types.

The general finish and colour scheme of interior appointment will be of a high order, and customers' particular requirements in this direction can easily be met.

On the lower deck amidships are two dressing-rooms—each to starboard—the forward one being for ladies and equipped with dressing-table, mirror, wash basin, etc., whilst the gentlemen's compartment is furnished with two wash basins, mirrors and points for electric razors. Hot and cold water is laid on to each dressing-room. Opposite, to port, is a lavatory, and, adjoining it, stowage space for bed linen. Two additional lavatories, each with washing facilities, are situated on the lower deck aft.

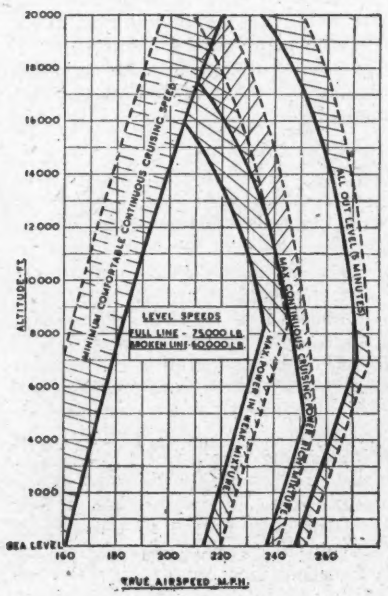
A spacious kitchen equipped with a refrigerator, steam oven, sink, etc., is included on the upper deck forward of the lounge/dining-room, and is fitted with a service lift to the lower deck, in addition to a bar.

Compartments for the stowage of mail, freight and passengers' personal baggage are arranged forward and aft; the bow capacity is 239 cu. ft., and is loaded via the crew's entrance to port. Two further compartments aft have an aggregate capacity of 404 cu. ft., the foremost of the two being provided with a direct-loading hatch to starboard.

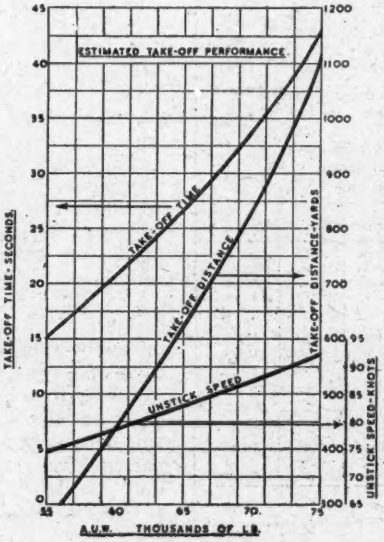
Forward of the front spar station the whole of the upper deck is devoted to the control crew of two pilots, navigator, radio officer and flight engineer. Two stewards are allowed for, in addition to the five flight crew.

The captain and first officer are seated at a conventional control layout similar to that of the Sunderland, and the navigator has a large chart table at which he sits facing to starboard; he is, of course, provided with a full complement of the most up-to-date navigational aids. The radio officer's station is modelled to suit B.O.A.C.'s latest requirements, and has a seat position facing to port. Aft of the navigator and radio officer two rest berths are fitted to port, and a lavatory with wash basin to starboard. The engineer's station, as in the Sunderland, remains on the starboard side between the wing spar frames, with a seat position facing aft.

Mooring operations are conducted from a hatch in the extreme bow compartment.



Performance curves for level speeds and take-off.



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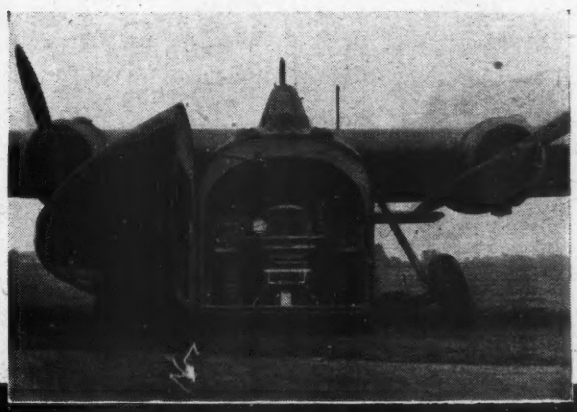
Unrestricted cargo space of 1440 cu. ft. capacity (27 ft. long x 8 ft. wide x 6 ft. 8 ins. minimum height).

★ **Simple loading**

By release of oleo pressure the aircraft sinks to the ground in 10 secs. for loading and unloading. (See *inset*).

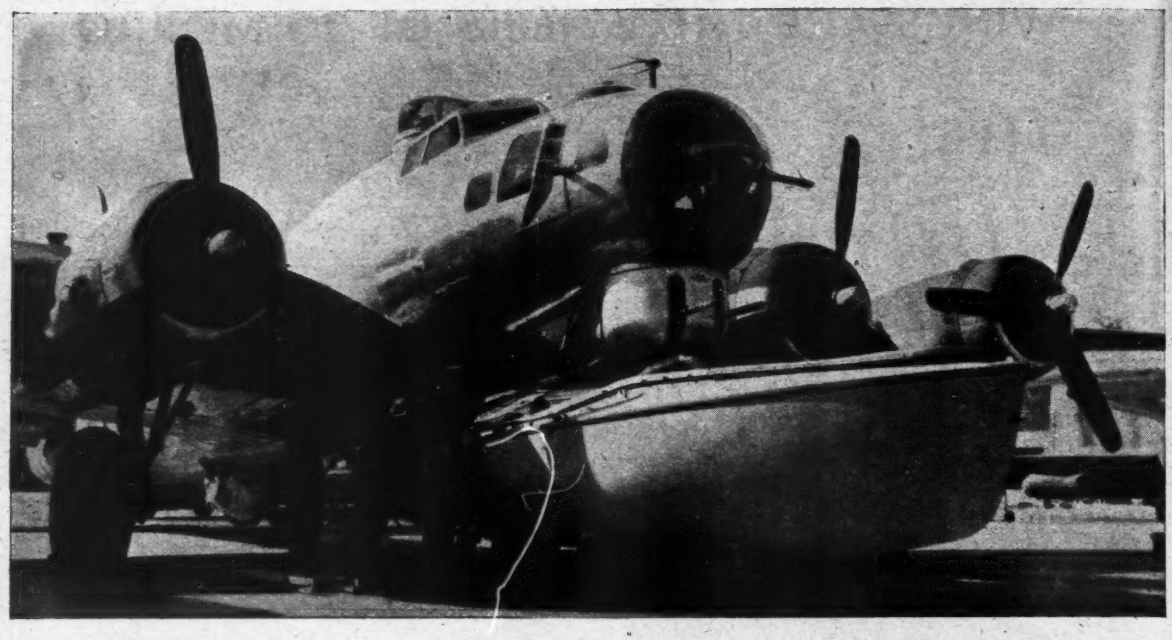
★ **Multi-cargo application**

Wheeled and tracked vehicles are driven directly into position and all forms of bulk freight are accommodated with ease.



GENERAL AIRCRAFT LTD.

FELTHAM MIDDLESEX



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Armstrong Siddeley Cougar

A New Medium-power Engine in the Famous "Feline" Range

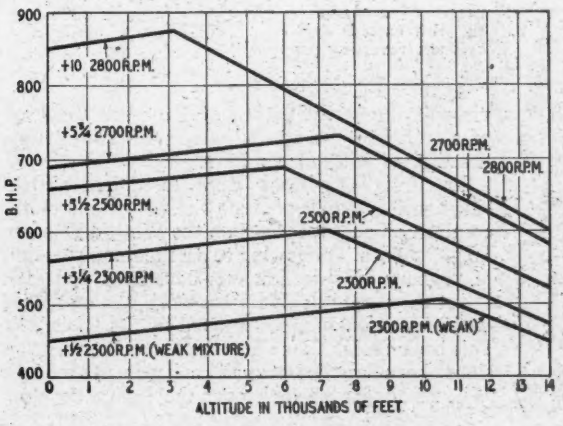
COUGAR is the name given to a new engine now being developed by Armstrong Siddeley Motors, Ltd., which thus retains the feline ancestry founded by the Siddeley Puma in the first world war and carried on in all subsequent Siddeley engines. There have been Tigers, Leopards, Jaguars, Lynxes, Cheetahs, Genets and Mongoose, but the new engine differs from them all, not only in being the first nine-cylinder single-row radial to be produced by the firm, but in many of its basic details. It is not yet in production but tests have been very satisfactory.

The Cougar is intended for use in medium-size transport aircraft and the larger type of single-engined trainers, and the relatively small diameter (49.5in.) coupled with close baffling, makes for a neat installation. The engine is geared and supercharged and drives a Rotol constant-speed, fully feathering three-bladed airscrew. For a take-off power of 850 b.h.p. the engine has a net weight of 1,020 lb. Among the new features is a R.A.E.-Hobson fuel injector and metering unit in place of the carburettor.

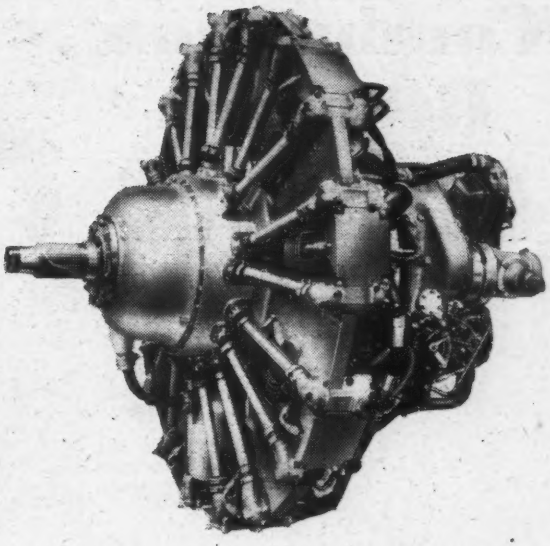
Cylinder Design Departure

In the design of the cylinders the Armstrong-Siddeley engineers have departed completely from their previous practice. A steel barrel is shrunk and screwed into an aluminium alloy head, and is secured to the crankcase by 16 studs. Two valves are fitted, and the exhaust valve is sodium cooled.

The crankcase is a one-piece aluminium alloy casting, closed at each end by diaphragm plates which carry the front and rear roller journal bearings for the split Manneton-type crankshaft. The master connecting rod is an air-hardened steel stamping to which the eight auxiliary rods are hinged by plain anchor pins secured by circlips at each end. Pressure oil fed through the hollow crankshaft lubricates the white-metal one-piece big-end bearing and the anchor-pin bushes in the auxiliary rods. Floating steel balance weights are attached to each crankshaft web and act as vibration dampers.



Projected ratings for the Cougar.



Valve operation is by a two-track cam drum (four cams on each track) running at one-eighth crankshaft speed and in the opposite direction, and actuating the tappets through push-rods and rockers. The whole valve gear is totally enclosed. The supercharger impeller is driven at 8.17 times engine speed via a spring drive and a centrifugal clutch. At the front of the engine is the airscrew reduction gear, which is of the epicyclic type, and at the back is a drive for a Rotol remote accessories gear box.

The R.A.E.-Hobson fuel injection and metering unit is fully automatic and corrects for boost pressure, altitude, exhaust back pressure and temperature. It also embodies a fuel pump and fuel cut-off. The fuel is fed direct to the centre of the supercharger rotor, in which it is finely atomised. There is also a boost control acting through bell-crank levers on the twin throttles. Both throttles and throttle box are oil heated, and the system completely eliminates the possibility of throttle-icing.

ARMSTRONG-SIDDELEY COUGAR

Single-row air-cooled 9-cyl. radial.

Geared and Moderately Supercharged.

Bore, 5.5in.; stroke, 5.5in. Capacity, 1,176 cu. in. (19.28 l.). Length, 51.5in., diameter, 49.5in.; reduction-gear ratio, 0.589 : 1. Supercharger drive ratio, 8.17 : 1; airscrew rotation L.H. tractor. International rating, 690 b.h.p., 2,500 r.p.m., + 5.5 lb./sq. in. Max. power rating, 730 b.h.p., 2,700 r.p.m., + 5.75 lb./sq. in.

	b.h.p.	r.p.m.	boost (lb./sq. in.)
At max. cruising (rich mixture)	560	2,300	+ 3.25
At max. cruising (weak mixture) ...	450	2,300	+ 0.5
At max. climb conditions	660	2,500	+ 5.5
At max. level conditions	690	2,700	+ 5.75
At max. take-off conditions (sea level) ...	850	2,800	+ 10

Net dry weight, 1,020 lb.

R.Ae.S. BIRTHDAY CELEBRATIONS

AS related elsewhere in this issue, the Royal Aeronautical Society celebrates its 80th birthday on January 12th. To mark this notable occasion, two celebrations are being held in London. On Friday, January 11th, the Society is to hold a dinner at the Guildhall for its members and a few distinguished guests. Invitations have been accepted by, among others, the Ministers of Civil Aviation and Aircraft Production and Supply, the First Lord of the Admiralty, Lord Trenchard, Lord Dowding and a number of R.A.F. Commanders-in-Chief.

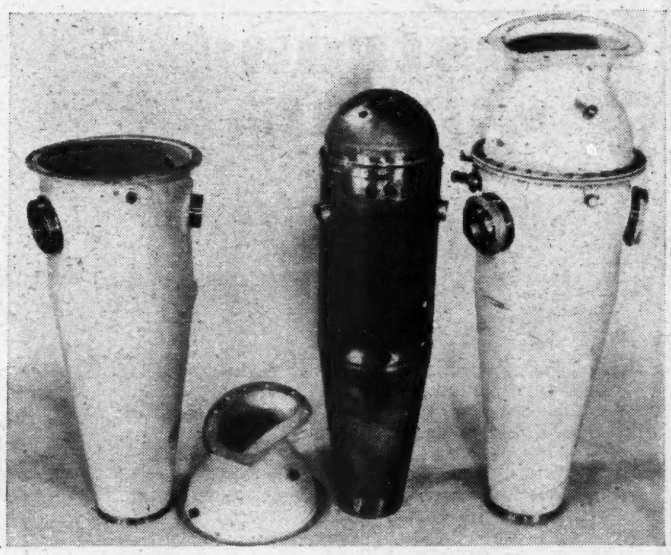
On the following day the president, Sir Frederick Handley Page, and the council will hold a reception for members and friends at 4, Hamilton Place, from 3 p.m. to 6.30 p.m. Admission to both gatherings will be by ticket only, obtainable from the secretary.

The various provincial branches of the R.Ae.S. will hold their own celebrations during the coming month.

To commemorate the occasion, the R.Ae.S. has prepared an illustrated history of British aviation during eighty years. Copies can be obtained from the secretary, at 4, Hamilton Place, London, W.1.

Combustion Research

The Development of Combustion Systems for Jet Engines : Pioneer Work of Lucas Laboratories

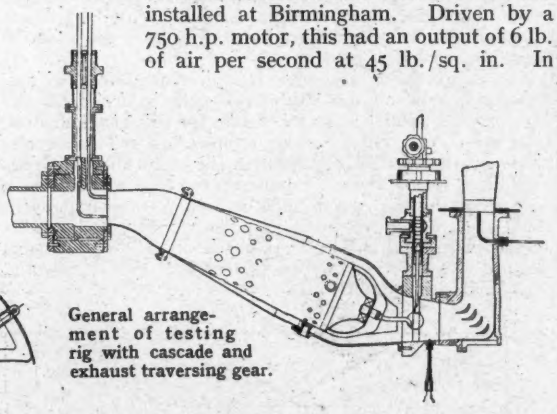


Component parts and assembly of Rolls-Royce Derwent combustion chamber.

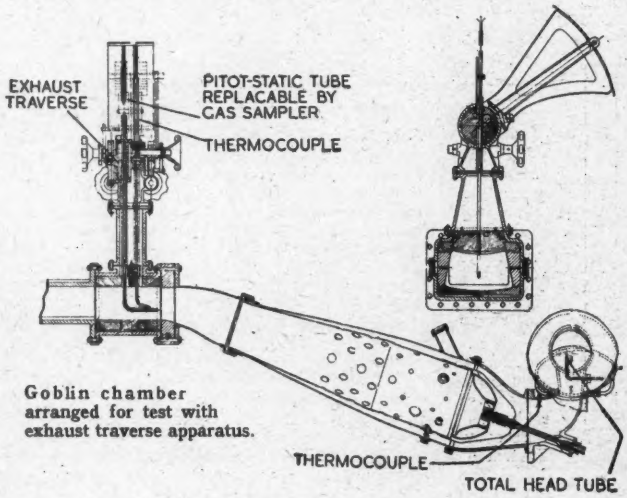
THE advent of the gas turbine for aircraft presented entirely new problems in the combustion of liquid fuel. Conditions of secrecy have hitherto prevented any detailed reference to the work of Joseph Lucas, Ltd., and their important contribution in the development of gas turbines to their present high state of efficiency. Both in the matter of combustion research and the fuel distribution system generally the technicians of that firm have played a leading role. It is in regard to combustion research that the present notes apply.

For the release of the necessary heat values at such a high rate of burning in apparatus of small bulk and low weight for aircraft installation there was no precedent. Due to the magnitude of the problem and the urgency occasioned by the war the loosely co-ordinated experimentation by various jet-engine builders did not meet the situation. Accordingly, in 1940 the newly formed Ministry of Aircraft Production approached Joseph Lucas, Ltd., to undertake a basic investigation of the problem. Research was to be conducted in combustion and fuel systems, and the development and manufacture of the necessary equipment was to be started. An early decision was taken that research should be carried out under the same air mass flow and density conditions as those existing in operation on the engine. It is to-day the considered opinion that this move was of prime importance and enormously facilitated and accelerated the development of the present successful system.

The immediate problem was to simulate conditions in the early Whittle engine which required a supply of air at a pressure of 40 lb./sq. in. at the rate of 3.25 lb./sec. for each combustion chamber. Even for a single-chamber test rig the air requirements were outside the scope of ordinary works supply, and a large compressor from the Ministry of Transport's equipment at the Dartford tunnel was obtained and installed at Birmingham. Driven by a 750 h.p. motor, this had an output of 6 lb. of air per second at 45 lb./sq. in. In view of the secret nature of the work the compressor house and the adjoining laboratory were constructed without windows.



General arrangement of testing rig with cascade and exhaust traversing gear.



Goblin chamber arranged for test with exhaust traverse apparatus.

Initial investigations were to determine the characteristics and examine the behaviour of the combustion chamber used on the Whittle W.2 and W.2B engines. Following this a modified principle of primary air injection was developed and after about three months' intensive work was embodied in the W.2B engines constructed by the Rover Co. This basic design, known as the B.23 chamber, has since been applied to all subsequent models. When Rolls-Royce took over the engine development and manufacture early in 1943 it figured on the Welland engines and was, of course, used in

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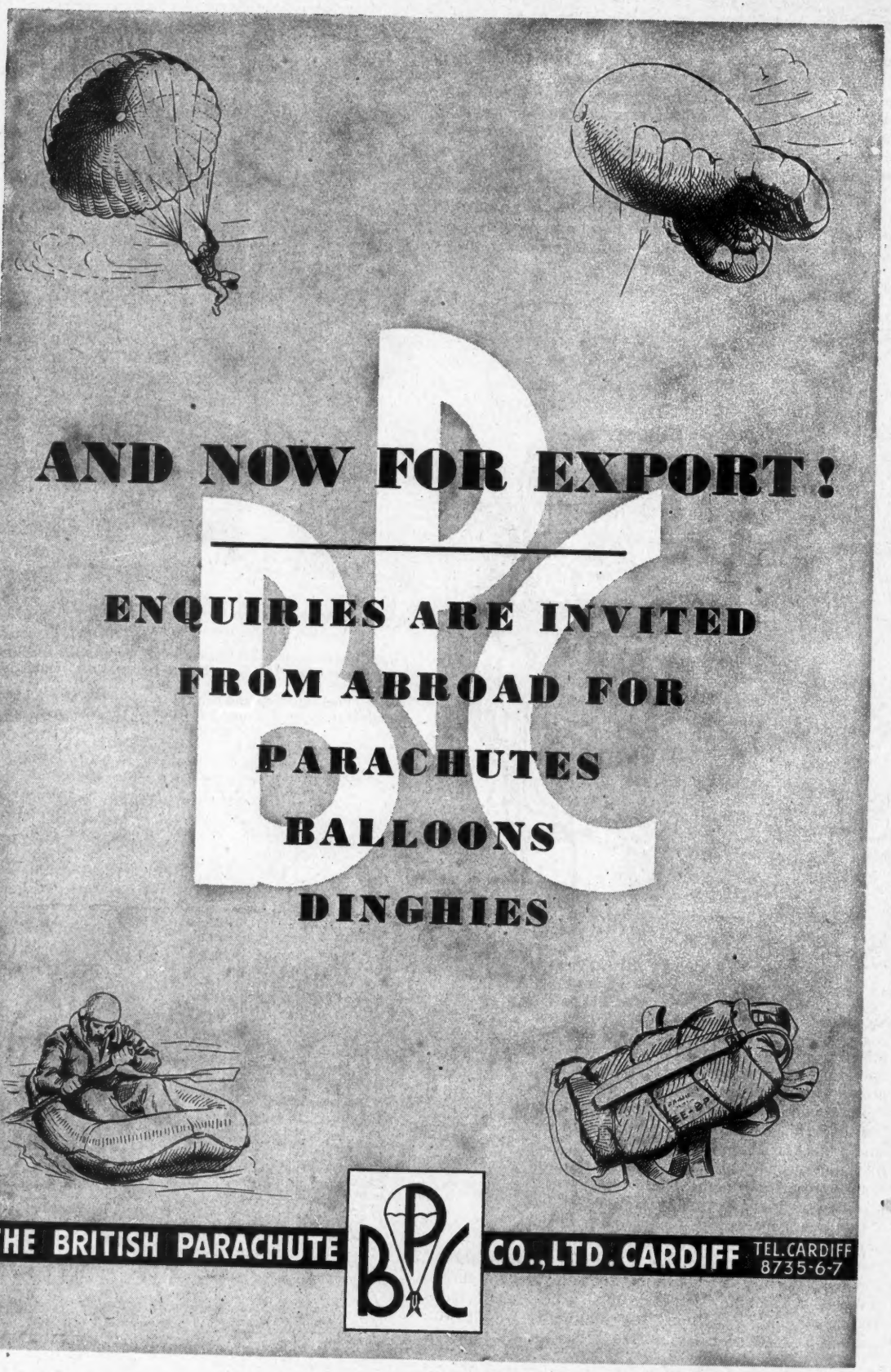
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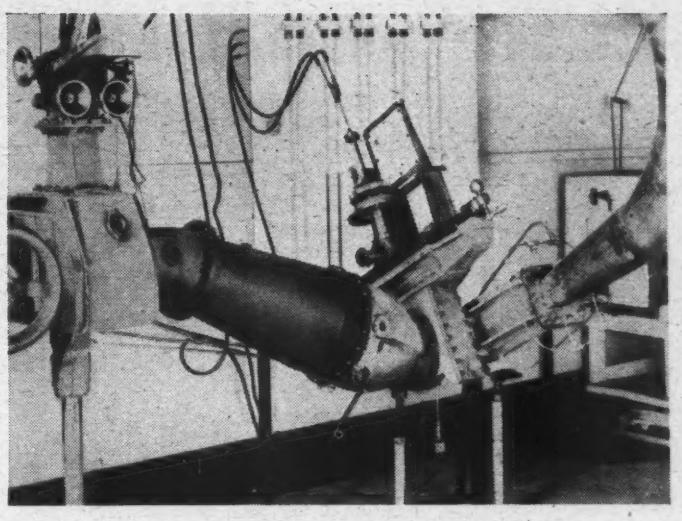
COMBUSTION RESEARCH

chilled and the reactions brought to a standstill. Subsequent analysis then shows, as nearly as possible, the composition existing at the sampling point at the time of withdrawal. Main gas analyses are carried out on the Haldane apparatus, which permits an accuracy of ±0.02 per cent. Complications are introduced when samples are taken from the primary combustion zone as it is possible to have unburnt fuel and "cracked" gaseous products as well as combustion gases. A special analytical technique and the necessary apparatus has been devised to meet these conditions.

Air distribution through the chamber is the subject of detailed study. It is intimately dependent upon flow conditions from the compressor, and particular care is taken in the design of the delivery duct. Pulsation, surging or shock from the compressor delivery would, of course, radically affect combustion conditions. A special traversing apparatus has been developed in the laboratory for investigating the airflow at the compressor outlet. This enables yawmeter, pitot-static tube and temperature traverses to be carried out at any position in the passage. The first measurement is of yaw in two perpendicular planes. When this is ascertained a pitot tube having the appropriate droop is set up with the correct yaw.



Cascade and exhaust traverses on de Havilland Ghost chamber.

"Pin-cushion" Models

Velocity diagrams obtained by this system of airflow measurement are visually demonstrated by so-called "pin-cushion" models. In a base block of shape and area corresponding to the section of the delivery passage, wires of a scale length to show velocity are set at the appropriate angle to indicate flow direction. In the case of a reverse flow in turbulent conditions this is represented by a loop.

Optical methods of investigating airflow are also being developed. It is intended to observe flow lines in a cascade box fitted with Perspex sides by means of a Schlieren set-up and to record them with an ultra-high-speed camera.

Similar traversing equipment is employed to determine pressure and temperature at the opposite end of the chamber, where the gases are delivered to the nozzle guide vanes of the turbine. The total pressure loss through the chamber is thus readily ascertainable.

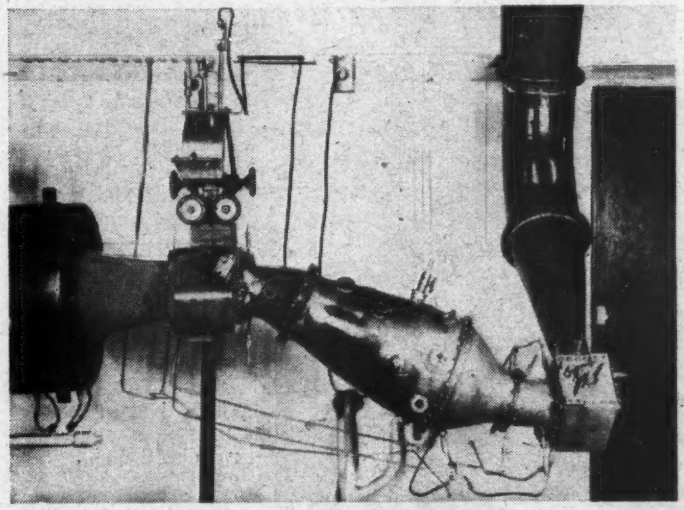
Combustion efficiency may be defined as

$$\frac{\text{Actual Temperature Rise}}{\text{Theoretical Temperature Rise}}$$

It will be appreciated that extremely careful measurements of air supply, fuel supply and assessment of calorific value are necessary to obtain an accurate estimate of the theoretical temperature rise. Traversing instruments carrying thermo-couples are used to determine the actual mean temperature at both the inlet and outlet of the chamber. All the apparatus was produced in the Lucas workshops. At the discharge end the gases have a mean temperature of about 800 deg. C. and a velocity of the order of 500-600ft./sec. It is, of course, essential that combustion be complete before reaching the turbine nozzle ring. Flame, unburnt fuel, or a stratified flow at different temperatures would have most detrimental effect on the turbine blading.

Mechanical design and methods of fabricating chambers and equipment are developed complementary to the combustion research. A wide range of materials has been tested for chamber components. Flame tubes are of Inconel or Nimonic 80 nickel-chrome alloys, whilst the outer casing is usually of mild steel. In view of the thin sections, the character of the material and the severe operating conditions, special welding techniques had to be developed. Apart from obtaining satisfactory combustion performance, it is obviously most important to extend the reliable working life of the components. Already the life of flame tubes in fully developed engines is in excess of two hundred hours. This was well in advance of the German units in service at the end of the war.

(*Concluded on page* 15.)



Rolls-Royce Nene chamber on test.

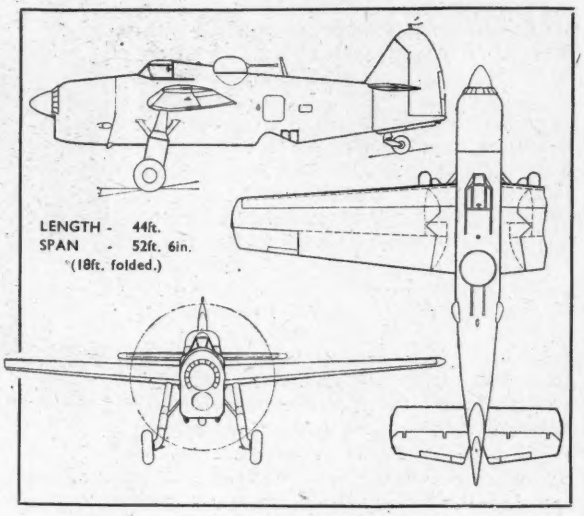
The Folland E.28/40

Torpedo Reconnaissance Bomber with Many Unusual Features

A CHANGE of Air Ministry policy in 1943 led to the stoppage of work on a most interesting project. The specification to which the machine was designed by Folland Aircraft, Ltd., of Hamble, was E.28/40, and was for a single-engined torpedo reconnaissance bomber. The requirements of the specification were very difficult. The machine was to carry a crew of three (pilot, observer/bomb aimer and air gunner/wireless operator), torpedo, bombs, power-operated gun turret, full navigation and night-flying equipment, the usual pyrotechnics, arrester gear for deck landing, and have a range of 800 miles. All this on a single Bristol Centaurus III engine!

Any firm might well have been forgiven for turning down the specification, but the Folland designers decided to "have a crack at it." That the result was unorthodox is scarcely to be wondered at, but it seems rather a pity that the company was not allowed to complete the machine, from which some instructive lessons might have been learnt.

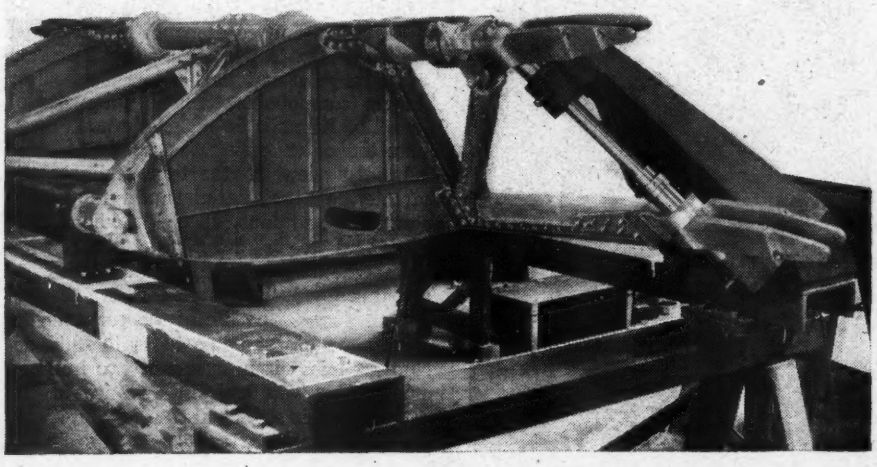
The E.28/40 was a high-wing monoplane of all-metal construction, with fixed and "spatted" undercarriage. Its most unusual feature was that the wing was carried in trunnions so that its angle of incidence could be varied from 4 deg. to 79 deg. The latter angle was, of course, only to be used when the wing was folded. Variation of incidence in the flying range was from 4 deg. to 15 deg. The choice of a variable-incidence wing was dictated by various considerations. For one thing, the amount of equipment that had to be carried was such that, with the limits of wing span and area prescribed by carrier operation, a wing with very pronounced high-lift characteristics had to be used. Leading-edge slots and trailing-edge flaps required a high angle of incidence for maximum lift, and to give the necessary ground angle with a fixed wing would have meant a very "stilty" undercarriage, which would have produced various troubles. By using the variable-incidence wing, not only were these avoided, but the further advantage accrued that the pilot could set his wings to the appropriate angle for take-off, landing or any flight condition, while maintaining the fuselage at an attitude which would give him the best possible view.



Variable Incidence and Area

There is, of course, nothing new in variable-incidence wings, but to the best of our knowledge the Folland E.28/40 is the only modern aircraft to incorporate this feature. Its wing had actually both variable incidence and variable area, for the trailing-edge flaps were of the type which, when lowered, extend beyond the main trailing edge. It was found that when the main wing flaps and leading-edge slots were opened to maximum lift, the tailplane stalled before the main wing. This difficulty was overcome by fitting leading-edge slats on the tailplane. These delayed the stall until well after the main wing had stalled.

The extra complications introduced by the need to vary the wing incidence were, of course, quite considerable. The wing-spar incidence pivots were carried in spherical bearings, and the main spar was of the three-boom type, two of the booms lying approximately under the upper skin, and the third boom just inside the lower skin. The upper booms formed the hinge joints, while the lower boom carried the latch joint. The change of incidence was effected by electrically operated screw jacks. When the wings were at maximum incidence the bottom joints could be



The spar was of three-boom type. Shown here is the folding hinge at the centre section.

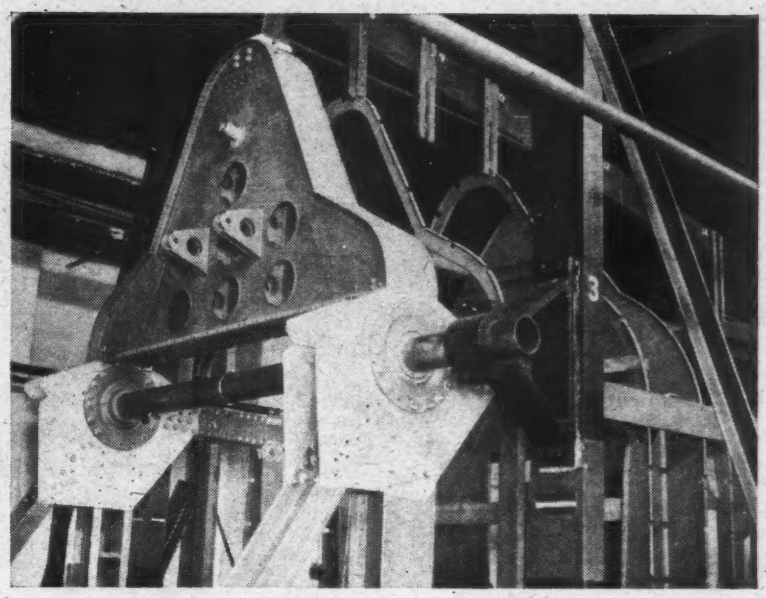
opened by gear-operated screwed pins. When that had been done, the wing was folded back by hydraulic rams in the centre section.

Normal construction was used in the fuselage. The Alclad frames were notched for the stringers, to which the Alclad skin was riveted. The pilot's cockpit was isolated from the stations of the other members of the crew, and was reached by climbing up the sides, helped by steps and hand grips, and through the opening uncovered by the sliding hood. The crews' stations were reached through a door in the fuselage side. A prone position was provided for the bomb aimer, and amidships was mounted a Bristol power-operated turret carrying two 0.5in. guns.

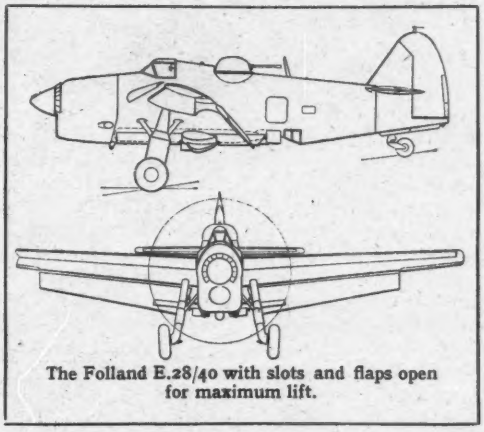
Navigational equipment included a D.R. compass with three repeaters, a P.4 compass for the pilot, and an 0.2 compass for the observer. A Mk. IV automatic pilot was fitted, and very complete pyrotechnics, including two Very pistols, eight signal cartridges, eight smoke puffs, six recognition cartridges, 20 flame floats, eight navigation smoke floats and launching tube, and eight aluminium sea-markers.

The Bristol Centaurus III engine, of 2,400 h.p., was to be installed in a reverse-flow power plant, supplied complete as a unit containing all auxiliaries, etc., ahead of the firewall. Starting was by the Coffmann cartridge system, and auxiliary services included a 1,000 watt 24 volt generator, hydraulic pump, air compressor and vacuum pump.

As the machine was never finished, only estimated performance figures can be quoted. It was calculated that the maximum all-up weight would be 18,250 lb. At that weight the top speed was estimated at 263 m.p.h. at 10,000ft., and cruising speed 230 m.p.h. The cruising range was to be 800 miles for which a tankage of 360 gallons was provided.



The wing-spar bearings in the sides of the fuselage. Wing incidence was varied by electrically operated screw jacks.



The Folland E.28/40 with slots and flaps open for maximum lift.

As explained on the previous page, there were very special reasons for adopting the variable-incidence wing in the Folland machine, and it is scarcely likely that the scheme will come into general use. It might possibly be worth while on certain aircraft types in conjunction with tricycle undercarriages, since the incidence could then be set to the values most suitable for take-off and landing, as well as to that which gave the lowest overall drag for cruising. The weight penalty might, however, be rather heavy.

COMBUSTION RESEARCH (*Concluded from page 13*)

Test performance of typical chambers is given in the above table. The figures of fuel and airflow relate, of course, to a single chamber.

	No. of Chambers	Fuel consumption gal./hour	Air Mass Flow lb./sec.	Air/fuel ratio
Experimental	6	17.2	2.3	60 : 1
Derwent V...	9	57	7	55 : 1
Ghost ...	10	67	8.8	59 : 1
Nene ...	9	81.5	10	55 : 1

Complementary to combustion research the Lucas organisation has been developing the special fuel-injection equipment and the related regulation and control mechanisms. All this work has been carried out in the closest collaboration with Rolls-Royce engineers engaged on the development of the Derwent jet engines.

ANDREW DALRYMPLE

WITH the death in a flying accident of the Hon. Andrew Dalrymple the aircraft industry has lost a prospectively outstanding aeronautical engineer. Though comparatively little known—largely because of his dislike of that habit of self-publicisation which has become an often-ridiculous feature of modern industry—he had already clearly shown his design abilities and might, if spared, have done great things in the world of aviation. He was immensely keen on his self-imposed career and, though the firm of which he was the co-founder was a small one, he was very far from "playing" at the game of aircraft design and development.

With Mr. A. R. Ward he ran an aircraft manufacturing concern, Chilton Aircraft, and had, in pre-war days, designed and built a quite outstanding single-seater monoplane. Since the war, during which his firm was engaged on sub-contract work, he had been interested, pending the arrival of better opportunities for power-driven light aircraft, in sailplane design.

As far as visual evidence can show, the accident, in which Mr. D. Phillips also lost his life, was caused by structural failure in a Feiseler Storch which had been brought over from Germany.

IN THE AIR—VIII

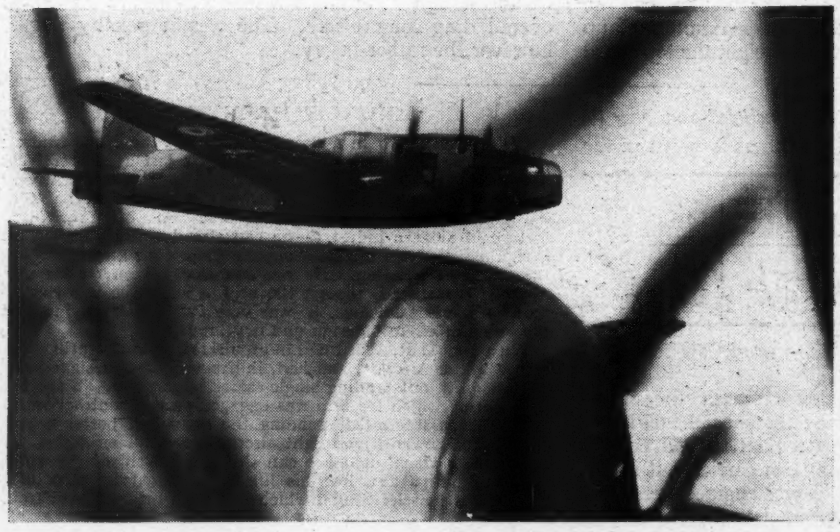
Geodetic Variations

"Indicator's" Impressions of the Different Wellington Marks : A Series of Lessons in Modification and Multiplication

The Vickers Wellesley which was the first of the geodetic family. A slightly modified version held the world's long-distance record (Egypt—Australia non-stop) until it was recently broken by the Americans.

FEW aircraft have borne without serious complaint such continuous increases of power, all-up weight and armament as the Wellington during its various vicissitudes. As power and weight were piled on the geodetics just stretched and took it happily. In fact, the only duty the Wellington has not been able to manage has been that of glider-towing. Apparently this work really tended to "lazy-tong" the fuselage too much, and the compilers of aircraft data would not tolerate the variations in fuselage dimensions which such abject labour might have involved. So the Wellington was saved that final indignity in its long history.

From the almost unarmed Mark I, with its smooth turrets and gentle Pegasi, to the Mark X, and the bristling Mark VIII for Coastal Command, the Wellington has behaved in much the same way. The Hercules were harder on the ears, the structure flexed just that little bit more, the inside looked more like that of a submarine than ever, and the take-off became a shade more fussy—but, to the driver, it was still the same aircraft once he had climbed on to his lofty dais and grasped the long throttles on his left. All the bits and pieces in his department were so very distinctive and "Vickersish"—from the control box and trimming "asterisk," to the dashboard undercarriage selector and full-clutch dual brake levers. Even the old Wellesley when, early in the war, it occasionally turned up for delivery airing, was, from the inside, curiously like its successor and could certainly not be mistaken for the product of any other firm.



Pre-war formation. Mk.I Wellingtons in formation over the North Sea during air exercises in peacetime.

And no other aircraft could feel like a Wellington in the air because always, between the pilot and the results of his efforts, there was a strange "something" which could only be described as flexibility. One could never be *quite* sure

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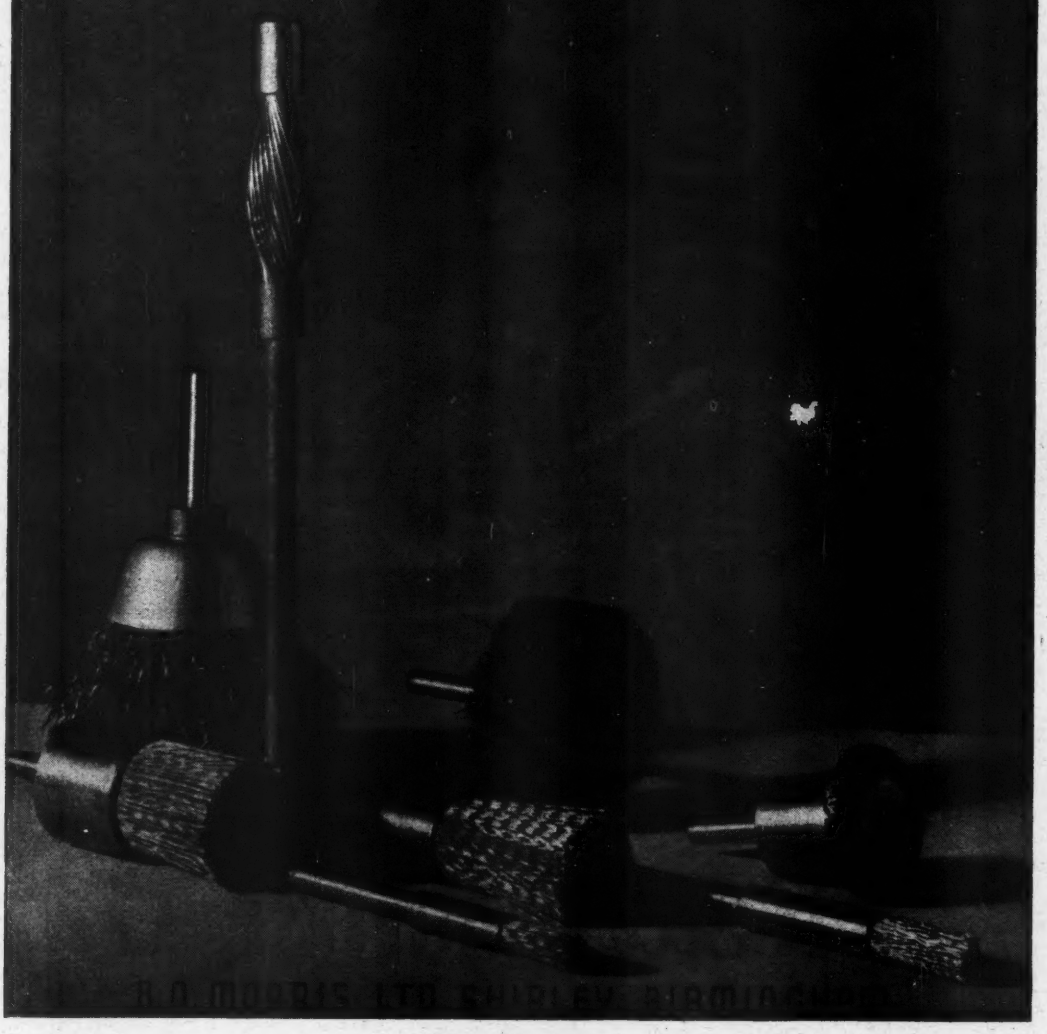
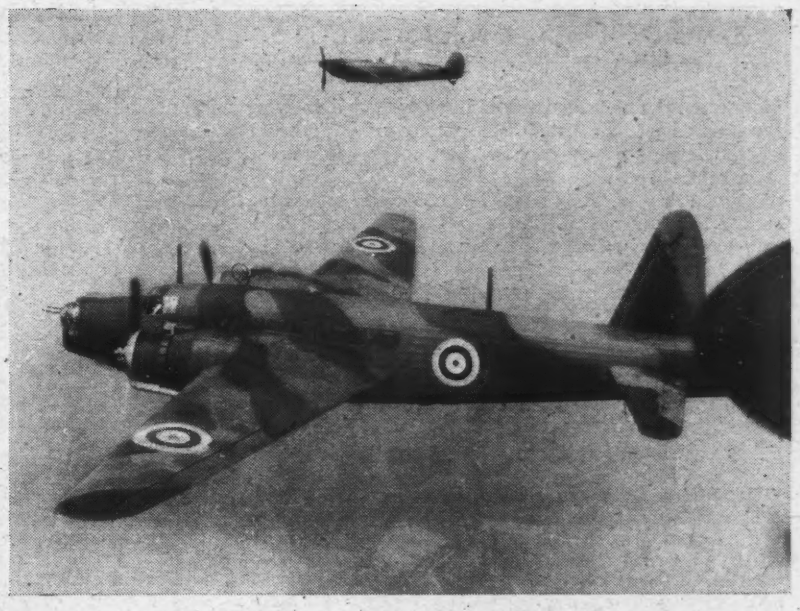


GEODETIC VARIATIONS

whether the controls were light, or heavy, or even whether one was actually flying or being flown. Everything waved quietly about, and all the time one could feel the very cross-section of the atmosphere. In bumpy weather the control column would move gently backwards and forwards, while rear turret operation would produce strange movements of the rudder, the motors rocked slowly up and down, and the wing-tips weaved in miraculous rhythm.

Once, I remember, a particular Wellington on test was voted by all the pilots to be little specially odd in its fore and aft reactions, but the difficulty could never quite be explained in so many words. The reactions varied too much. It was not until a wandering engineer officer happened to tap the elevators that the cause of the trouble was finally traced. Not only were several elevator ribs actually missing, but there was most of a complete kit of tools nicely sewn up inside the horn balance. Needless to say, this particular aircraft did not come from the manufacturers; somebody had been tampering with it elsewhere. Probably a tractor had run into the tail, unofficial repairs had been put in hand, and the aircraft had been "allotted" before the job had been completed by someone who had gone on a "forty-eight."

One supposes that problems of general design are the causes of tall undercarriages and large ground angles for certain types, but for obvious reasons there is no doubt that an aircraft with a dumpy undercarriage is very much more forgiving during a careless arrival. In fact, of course, the flatter the final ground angle the nearer it is to the tricycle ideal of "level landing," with its consequent leap-proof touch-down behaviour.



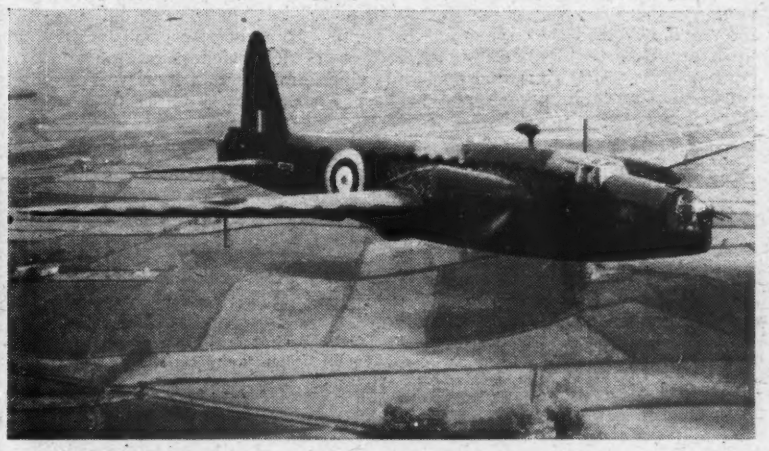
The Mark III and Mark X Wellingtons were fitted with Bristol Hercules engines. The greater power enabled heavier take-off loads to be carried.

The Wellington was one of the better examples of the theory, though it was possible to execute a heavy tail-first landing and to damage the back parts if full elevator was used from a highish final approach speed. But given some knowledge of what to expect, landings of the utmost carelessness could be carried out successfully and with little more than a mild float after a violent "wheeler."

Overshoot procedure involved the pilot in a good deal of hard work at its commencement and, before the installation of a "slow leak" flap-return stop, one had to be very careful with this control and to raise the flaps in a series of quick stabs if drag had to be reduced while the aircraft was still near the ground. The degree of sink was otherwise somewhat phenomenal, since the flaps returned very rapidly, and it would feel for all the world as if the entire lift had been momentarily removed from the wing. In fact, I sometimes wonder whether very violent flap retraction reactions are not caused by a temporary breakdown of the wing flow rather than by any changes in centre of pressure position or sudden reduction of lift at any particular angle.

In the earlier days, too, the pronounced nose-up effect of flap-lowering could cause a minor panic in the driving compartment, and even after the trim-compensating arrangement had been standardised there would occasionally be peculiar effects if the c.g. happened to be well aft.

Except when heavily loaded there was no great difficulty in single-engined aviation with any of the Wellingtons, though, at least with earlier Hercules versions, it was better to leave the engine wind-



The Mark II Wellington was fitted with Rolls-Royce Merlin engines. Only a limited number of these went into service.

GEODETIC VARIATIONS

milling if possible when the failure happened to be on the port side, since this carried the one and only hydraulic pump. A considerable number of strokes were otherwise necessary on the hand-pump to obtain the green lights. Once, after the blower of the port engine had disintegrated, I left it windmilling all the way back, preferring to lose height slowly rather than to face a hectic hand-pumping few minutes over the airfield. I feathered the airscrew only after the green lights had been obtained, and then used the hand-pump to adjust the final approach while lowering the flaps.

All the Wellington marks seemed to be very nearly vice-free as aircraft. They could be brought in at a ridiculously low speed and, at one stage of the war, we were landing them almost daily on miniature satellite strips without damage and without temporary neurotic disturbances. My experience of the Viking has so far been limited to distant inspection, but if, as its shape suggests, this aircraft has Wellington characteristics, then there cannot be very much wrong with it. For a year or two, if our civil aircraft are sound and safe rather than aerodynamically exciting and potentially lethal, we shall be making progress in the right direction and at the right pace.

The New Service Pay

How the R.A.F. is Affected : New Aircrew Categories

EVEN the thirty-one printed pages of the White Paper on the new rates of pay for the three Services cannot attempt to tell every man what he will get in the future. In some cases, such as the Naval Air Branch and the R.A.F. Regiment, it merely says that their cases will be dealt with later. Pay is always a complicated affair; but the new rulings simplify it in many ways, and they strike a broad equality between the three Services and civil employment. In some ways the Serviceman will do much better than most civilians. For example, a sergeant in the R.A.F. with 22 years' service, of which five were with the rank of corporal, will get a pension of 34s. a week. The cost of a Post Office annuity of 34s. a week for a man of 40 would be £1,860. In other words, that pension at the age of 40 is the equivalent of about 25s. additional pay a week through his service.

As explained in a leading article in this issue, aircrew members will in future be divided into five main categories, namely, Pilot, Observer, Signaller, Engineer, and Gunner. Each will start as a Cadet under training, and thereafter will rise to Pilot (or other category) IV, then to Pilot etc. III, II, and I, and at the top of the tree will be the Master Pilot, Master Gunner, etc.

The new basic weekly rates of pay for the R.A.F. are shown in the table enclosed. The group letters take the place of the old trade groups I, II, III, etc.

In addition there will be increments for length of service in rank—3s. 6d. a week after four years' service as corporal or pilot III; 3s. 6d. after each four years as sergeant or flight sergeant, pilot II, or pilot I; and 10s. 6d. after each four-year period for warrant officers and master pilots. Good conduct pay will be 3s. 6d. a week after five and 10 years' service. Arrangements for pensions and gratuity will be the same for all three Services; there are, however, special provisions for pilots and navigators. Pilots and navigators leaving the service after 22 years' aircrew service will receive a total in normal cases of 55s. a week; pilots and navigators who transfer to the Reserve on completing five years' service will receive a gratuity of £200.

GROUND TRADESMEN

	Group A	Group B	Group C	Group D
	s. d.	s. d.	s. d.	s. d.
Recruit, 28s.				
A/C.2 ...	45 6	42 0	38 6	35 0
A/C.1 ...	49 0	45 6	42 0	38 6
L.A.C. ...	52 6	49 0	45 6	42 0
Cpl.... ...	66 6	63 0	56 0	52 6
Sgt. ...	84 0		73 6	
Flt. Sgt. ...	101 6		84 0	
W.O. ...	119 0		105 0	

AIRMEN AIRCREW

	Pilot and Navigator	Sig., Engr., and Gnr.
	s. d.	s. d.
Pilot, etc. IV	73 6	70 0
,, III	87 6	84 0
,, II	105 0	101 6
,, I	122 6	119 0
Master Pilot, etc. ...	140 0	136 6

The normal service for pension will be 22 years, and more men will be allowed to re-engage for pension than before the war, up to the age of 50 or even 55.

An airman will be recognised as qualified for marriage allowance at the age of 21, instead of 26 as before. There will be a flat rate of marriage allowance, irrespective of the number of children. It will start at 35s. a week in the lowest ranks, with higher rates on promotion. A sergeant will get 40s., a flight sergeant 42s., and a warrant officer 45s. Marriage allowance will be subject to income tax, but it will not hit the men hard. A sergeant in the new Group B with two children (for which he will get 10s. a week like any other citizen from the Family Allowance Act) will be liable for about 7s. 6d. in a year. The highest rate of tax for a married man will be 27s. 10d. a week, by a warrant officer in Group A with eight years' service in the rank, and his gross income will be £9 10s. a week.

This scheme envisages a long-service Air Force.

AN S.B.A.C. RESIGNATION

AFTER a period of fifteen years as secretary of the Society of British Aircraft Constructors, Mr. H. R. Gillman has resigned that post as from the end of 1945. His aeronautical career began in the very early days, in 1912 in fact, when he joined the Royal Aircraft Factory, as it then was. In the first world war he served in the Royal Naval Air Service, specialising on airship engines. Upon being demobilised in 1920 he joined Lloyds aviation department, where he compiled the first civil aircraft and pilot registers.

Mr. Gillman's work at the S.B.A.C. is well known in the aircraft industry, but the outside world is probably not aware that he has prepared a number of memoranda on various aspects of civil aviation, on aircraft inspection, and on production and repairs. He now proposes to take a well-earned rest, but after he has had that it is to be hoped that his long experience will not be lost to British aviation.

N.P.L. APPOINTMENTS

MR. A. FAGE, A.R.C.S., D.I.C., F.R.Ae.S., F.R.S., has been appointed superintendent of the Aerodynamics Division of the National Physical Laboratory with effect from January 1st, 1946, to fill the vacancy caused by the resignation of Mr. E. F. Relf, who, as recently recorded in *Flight*, is taking up the post of principal of the College of Aeronautics. Mr. Fage has been a member of the staff of the National Physical Laboratory since 1914.

The retiring superintendent of the Metrology Division of the N.P.L., Mr. J. E. Sears, is succeeded by Mr. R. H. Rolt, M.B.E., B.Sc., A.C.G.I., M.E.Mech.E.

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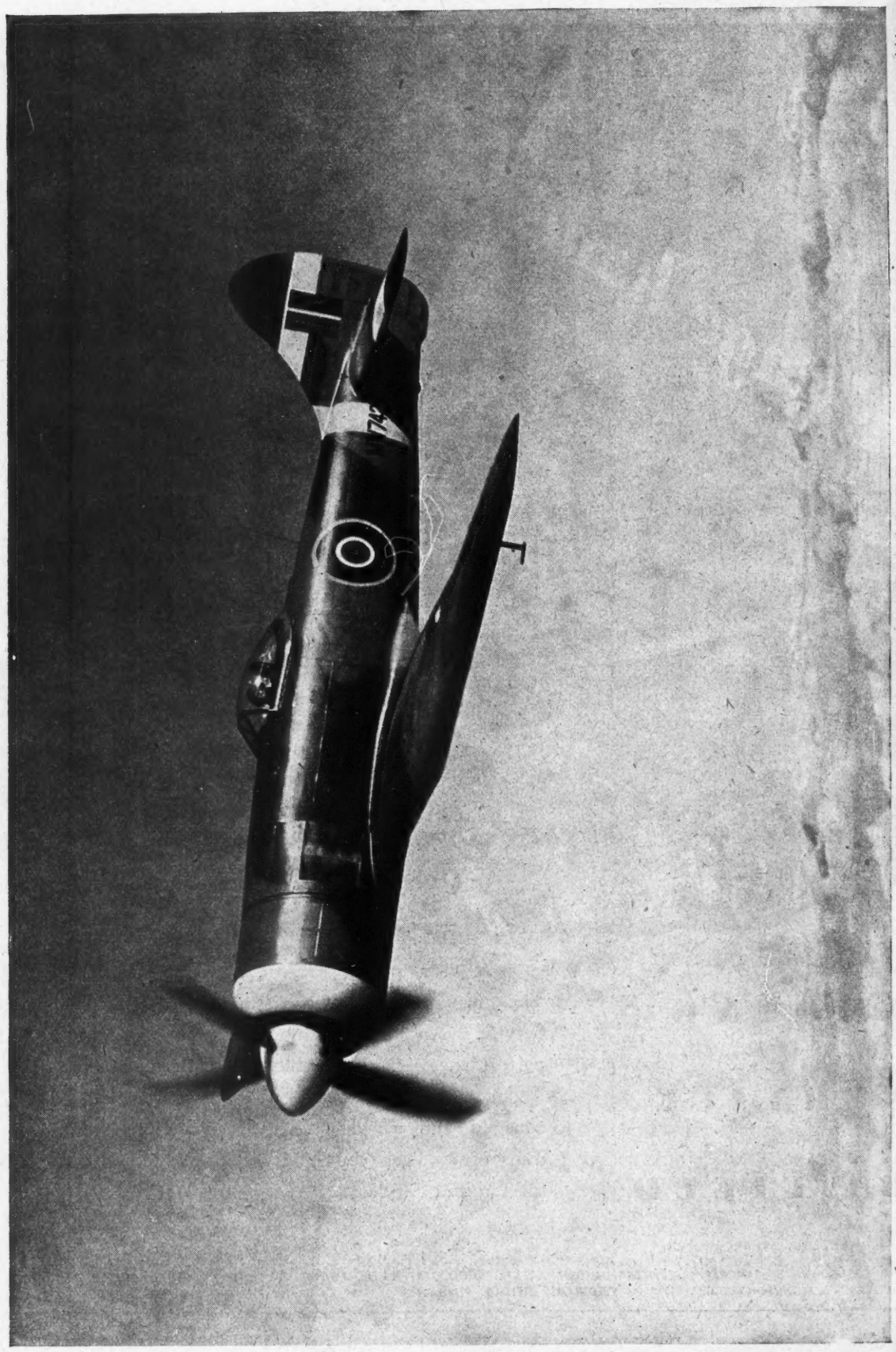

THE HAWKER TEMPEST II (BRISTOL CENTAURUS ENGINE).

Adv.

American Newsletter

More Jottings from an Englishman in the States

A POPULAR word in the American vocabulary at the moment is "reconversion." Everything is being "reconverted," and the word is applied to almost anything that was once used for war and is now used for peace, whether man-power or machine-power. (Everything except the atom, that is.) If you apply it to the present developments in civil aviation, however, it means only one thing—a surge of progress that is both prophetic and staggering.

For instance, nearly 400 surplus DC-3 and DC-4 aircraft have been allocated to either domestic airlines in the States or to foreign airlines, and firms such as Republic are up to their eyebrows in converting DC-4s from wartime to peace-time transports at a cost of $175,000 per aircraft.

The 50 DC-4s which Republic are converting for American Airlines will be sixty-seaters.

Reports of enormous light aircraft orders continue to come in: Taylorcraft, 8,000; Republic, 4,000; Ercoupe, 10,000; Piper, 5,000; the Globe Swift, 4,000. Continental Engines, who have a productive capacity of 1,000 engines a month, are said to have orders on hand for 35,000 engines in 1946.

Estimated light aircraft production for the year April, 1946, to April, 1947, is 50,000 machines, of which Taylorcraft expect to produce 25,000; Europe, 17,000; and Republic, 5,000.

A survey by the Civil Aeronautics Authority on the number of jobs in, or created by, civil aviation in 1955 predicts a total of 901,300, as compared with 142,300 in 1939. The same survey forecasts at least 400,000 civilian aircraft in use by that date, with 280,000 of these being used for personal business or recreation, 40,000 by business concerns, and 80,000 by commercial services. They expect that U.S. airlines will transport two million passengers to foreign ports and twenty million in domestic operations.

✦ ✦ ✦

So far as aviation rumour goes, the West Coast reports that the B-29 Superfortress is undergoing a redesign to accommodate four Pratt and Whitney 4360 Wasp Major engines, and will be known as the B.50. Reversible-pitch airscrews will be fitted, and much attention has been paid to a possible reduction in weight. The tail surfaces have been enlarged and the engine nacelles redesigned. It is said that a B-29 airframe, temporarily fitted with the Type 4360 engines, had an improved critical altitude of some 7,000ft.

It is not known whether Northrops are going to continue with their prone-position jet flying-wing fighter. The first machine crashed, killing the pilot, Harry Crosby. The history of these flying-wing aircraft has been an unhappy one, and several excellent pilots have been killed. Unsafe stall characteristics were certainly responsible for one crash, but the cause of this last one is not known.

✦ ✦ ✦

The B-29 that captured the long-distance record put on a good show, but the crew had their troubles during the trip, apparently. Rumour has it that the automatic pilot packed up a few hours out and that a nice smell of burning, traced to a red-hot junction box, put the wind up everybody at one stage. The machine was flown a large portion of the way with one airscrew feathered, the official story being that, at the low power necessary to get the range, the engines got too cold, with resultant plug and carburation troubles and severe vibration. In order to overcome this, one engine was cut and the power on the other three increased! Actually, it appears to have been a burnt-out supercharger bearing on one of the outboard engines that was the trouble.

But whatever the difficulties, the smashing of the record by just over 1,000 miles was a fine effort. The fuel carried totalled 11,140 U.S. gallons, 640 gallons of which was in fuselage and bomb-bay tanks. There were 300 U.S. gallons left on arrival in Washington.

Until the supercharger failure forced an alteration in the power settings, the engines were being run at 42 per cent. power, and when the outboard engine was cut, this figure was raised to approximately 50 per cent. for the remaining three engines.

"KIBITZER."

THUNDERBOLTS TO RAINBOW

CONCERNED with the development of the P-47 (Thunderbolt) for almost five years, Republic Aviation decided that it was time they entered into the large aircraft business, so they went ahead and did it to the tune of a four-engined aircraft weighing 113,000 lb. odd. Although the aircraft was originally built to an Army specification, the company was quick to realise that if peace did come sooner than was expected, they would have an aircraft of such a basic design that it could easily be turned into a high-speed civilian transport, and already the specification for the Republic "Rainbow" has been issued and tentative orders obtained.

There is nothing particularly unconventional in its appearance, except that it is beautifully streamlined and finished. The four Pratt and Whitney Wasp Major engines, giving a take-off power of 3,250 b.h.p. each, are mounted in long streamlined nacelles, each of which is about the size of a P-47 fuselage, and each of which contains two exhaust-driven turbo-blowers, one mounted horizontally and one vertically. The exhaust gases are ejected at the tail of each nacelle, through a jet orifice, and from each of these the designers claim an equivalent thrust of 200 h.p. at full power—800 h.p. in all.

The wing is semi-laminar flow and is fitted with slotted Fowler-type flaps with a maximum travel of 60 deg. Ailerons, elevators and rudder are spring-tab "boosted" and no power boost is employed. The tailplane is set high up on the fin. The undercarriage has single wheels which retract sideways and upwards into the wing; the nosewheel is double.

The whole of the cabin is pressurised, and the pilot's windscreen is the front bulkhead. Forward of this windscreen, and fitting like a cap to give a perfect streamline to the fuselage, is a Perspex nose, so that for normal flying the pilot looks forward through his own windscreen and through the double curvature of this nose. This space is heated to prevent frosting and misting, but as it was fully realised by the designers that this would probably be insufficient for bad weather flying, a clear-view system has been devised that is certainly both new and very ingenious.

The false nose is split in half, horizontally, and is so constructed that hydraulic rams, pilot-operated, can drop the top half down inside the lower section, thus leaving the pilot's normal windscreen as the only thing between him and the outside world. When dropped in this manner, the top of the false nose is almost flat, whilst the bottom half remains, of course, fully concave, giving an effect not unlike that of the old Fighter Blenheim nose.

Other main details of the Rainbow are as follows:—

Span	129ft. 2in.
Length	98ft. 9in.
Overall height	29ft. 11in.
Max. fuselage diam.	10ft. 3in.
Wing area	1,640 sq. ft.
Weight empty	66,980 lb.
Take-off gross weight	113,250 lb.
Payload for 4,150 miles	10,000 lb.
Passenger capacity	40
Crew capacity	7
Cargo capacity	1,200 lb.
Estimated max. speed at 40,000ft	450 m.p.h.
Stalling speed	95 m.p.h.
Maximum range	4,150 miles

CIVIL AVIATION

Controlled Freedom

"Implementing" the Effects of the Removal of the Civil Flying Ban : Organising Aircraft Movements

AT first glance, the wad of material which includes *Notices to Airmen* Nos. 5 to 25, might give one the impression that civil aviation freedom has been given with one hand and taken away with the other. Whereas Messrs. Smith, Jones and Robertson are now free, subject to fuel restrictions, to climb into their aircraft and to go anywhere, these unfortunate persons might appear to be so hemmed in by restrictions that their freedom is quite illusory. On further investigation, however, the mass of necessarily restrictive instruction will obviously not concern the private pilot to any great extent, since nearly all of it deals with the inevitable rules and regulations which must be applied in "instrument flying" conditions, and, in fact, the civil pilot will be almost, if not quite, as free as in the pre-1940 era.

All those involved will, in due course, receive or have the opportunity of seeing the various *Notices* concerned, and we shall merely give a summary of the conditions for the benefit of the ordinarily interested reader and future club pilot.

In general, the conditions are very similar to those applying before the war. A thorough meteorological service will be available, with radio facilities for those who care to make use of them, beacons for fly-by-nights, a continuation of the Service rescue organisation, and a comparatively simple airway zoning and directional system. For the moment, only twenty-five airfields have been officially allocated for the use of civil aircraft, but this number will naturally increase as conditions settle down and as the R.A.F. reaches peacetime strength and location.

The first of the new series of *Notices*, No. 5, includes a very comprehensive list of obstructions which are likely to cause trouble in bad weather. Some of these are lighted, and many of the others will be so lighted in due course. Air traffic control stations have been made available, and a list of these is given in *Notice* No. 6. For ordinary purposes the ground control signals employed will be similar to those in use at Service airfields during the war.

Radio Facilities

Twenty-one radio stations will be available, four of them with Standard Beam Approach facilities and, in the near future, broadcasts will be re-started from Borough Hill, Daventry, giving a continuous series of meteorological forecasts, "actuals," navigational warnings and airfield serviceability details. In addition, a large number of civil and Service airfields will be available for the provision of detailed meteorological information for civil pilots. These points are covered in *Notices* 7, 8 and 9.

A very extensive system of light beacons, each flashing identification letters or signals, was developed during the war, and these beacons will continue to operate. A complete list is given in *Notice* No. 10, while No. 11 gives a list of the airfields providing a "fixed" aeronautical telecommunication service for emergency messages, movement telegrams and so forth. The air-sea rescue organisation, though reduced, will still be available, and this will be gradually arranged to suit future Service needs and civil requirements.

Bad weather radio approach systems are now installed at Bristol (Whitchurch), Hurn, Croydon and Speke. At least for the time being, this will be the Standard Beam Approach installation, which is similar to, but slightly simpler than, the original Lorenz system. Whether or not this S.B.A. installation will be finally standardised depends on any international arrangements which are made. The installation is described, with the procedure for its use, in *Notice* No. 13, while in No. 14 is a description of the new medium-frequency S.B.A. system available at Speke, Liverpool, for the benefit of aircraft crossing the Irish Sea and carrying only medium-frequency radio equipment. The main beacon at Speke may also be used for W/T communication.

Danger Areas

A very considerable number of areas are still "dangerous," and an examination of the map showing these areas suggests that the ultra-cautious pilot will find his movements very restricted. Such danger areas, however, merely give indications of possible rather than continuous danger, and will no doubt be largely ignored. Copies of the current danger area map may be obtained from the Ministry of Civil Aviation. By contrast, as already mentioned, the present list of available airfields is distressingly short, but this list will no doubt be developed and enlarged rapidly as conditions return to normal. Pending the production of new civil aviation maps, a series of sheets, varying in scale, are available to cover Great Britain, Eire, and Europe. Details of these are given in *Notice* No. 18.

Most important of all are the *Notices* Nos. 19 and 20, which deal with the zoning and directional systems to be used in this country. The object of the exercise, of course, is that of reducing the risk of collision in bad weather and, in general, the regulations will not trouble the civil pilot flying in fair conditions. The arrangements are quite temporary, and in due course a revised procedure for civil aircraft will be introduced. "Military Airways" are laid down between London and Paris, and between London and Brussels—each ten miles wide and extending vertically between 3,000 and 10,000ft. The existing "approach zones" involve the areas of London and Bournemouth. The "directional system" is similar to that in force before 1940, but it is considerably simplified in that the specified sectors and heights now cover all areas. "Aerodrome traffic zones" are in existence at the five main London airfields—Croydon, Biggin Hill, Bovingdon, Hendon and Northolt—and permission must be obtained before entering these.

RESULTS FROM BERMUDA

FOLLOWING the meeting between Canadian and British Government representatives in Bermuda, a bi-lateral Canadian-British agreement has been signed whereby a maximum of three hundred and fifty passengers every week will be able to fly each way on Trans-Canada Airline and B.O.A.C. aircraft, the companies operating jointly. The two terminals will be Dorval, Montreal, and Prestwick—the latter until Heathrow is fit for all-weather use.

In the meantime, Trans-Canada Airlines have reduced their Atlantic fare to £83 for the single journey, as against the £127 previously charged The service is now opened to non-priority passengers.

AUSTRALIAN DECISION

THE recent Australian High Court decision on the Air Lines Bill appears to agree that this Bill is valid save for one important section. This section of the Bill prevented the issue of an airline licence, to anyone other than the Air Lines Commission, for the operation of an inter-State service between points used as stopping places by the nationalised service. The Court also decided that an amendment made to the Air Navi-

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CIVIL AVIATION NEWS

vation Regulations, giving an unqualified discretion to grant or refuse an airline licence, is invalid.

In fact, this decision means that the Australian Government cannot now cancel the licences of firms already operating and cannot refuse to renew them or to grant applications for further licences. The Australian Government is expected to hold another referendum asking for wider powers in this matter.

FREEDOM IN NEW ZEALAND

ALL wartime restrictions on civil flying have now been removed by the New Zealand Government. Flying clubs will not, however, be permitted to start any charter operations until New Zealand National Airways has advised the Government on the licence requirements for such work.

CHICAGO AIRCRAFT PROJECT

CHICAGO is planning a 5,235-acre airport to cost $40,000,000. (The new Idlewild Airport outside New York is estimated as costing $90,000,000.) The Chicago runways will be eight of 6,150ft. and four of 7,700ft.

MORE D.C.3s FOR AUSTRALIA

AUSTRALIAN NATIONAL AIRWAYS, Guinea Airways and Qantas Empire Airways were each represented at a recent sale of surplus American aircraft held in Manila. All three purchased C-47s Skytrains—alias D.C.3s—as stop-gaps to deal with the very considerably increasing demands for passenger accommodation on Australian airlines.

NO MORE WAALHAVEN

PRE-WAR civil pilots will be sorry to learn that Rotterdam's old original airfield at Waalhaven has been so seriously damaged by air attack during the war that any idea of reconstruction has been abandoned. Instead, a new airfield is being laid out at Barendrecht, some three miles south of the old airfield.

On the other hand, work is going ahead at Schiphol, Amsterdam, and this will still be the Netherlands' main international airfield.

AMERICA IN PORTUGAL

FOLLOWING our own agreements with the Portuguese Government, the U.S. State Department have also concluded an agreement in Lisbon. This will permit the operation of services, via Bermuda and the Azores, to Lisbon, with one branch proceeding to London and another to Barcelona and Marseilles, with a second route via Newfoundland to Lisbon, Madrid, the Mediterranean area and the Middle East, and a third across the Pacific and including a stop at Macao, which is a Portuguese possession. In return, Portuguese operators are granted the right to run services from Lisbon to New York.

THE NORTH ATLANTIC MEETING

MARCH 4 has been now decided upon as the date for the North Atlantic regional meeting of the P.I.C.A.O. The meeting is being convened by the Government of Eire, which has been providing the secretariat for the Transatlantic Air Service Safety Organisation. All states operating or about to operate air services across the North Atlantic will be invited so that the various problems can be discussed. It is now expected that the European-Mediterranean meeting in Paris will be held towards the end of March or at the beginning of April, and the Middle East meeting, to be held in Cairo, will be convened as soon as possible afterwards.

PICAO DELIBERATIONS

THE various and complicated committees which make up the Provisional International Civil Aviation Organisation are quietly producing various decisions.

The Communications Committee, for instance, have found that differences of language present insuperable difficulties in the field of telecommunications and the only suggestion they can make lies in the continued use of an expanded and improved "Q" code—which, of course, involves the international use of W/T rather than R/T.

A comprehensive set of modernised international standards and recommended practices for international radio work has been evolved by the same committee. Minimum adequacies of facilities have been decided upon, and the obvious stipulations made concerning the standardisation of equipment both in the air and on the ground. For long-distance navigation Loran, one of the radio aids developed during the war, has been recommended, with the universal adoption of the U.S. Army SCS-51 instrument or an equivalent landing system.

The Committee on Rules of the Air and Air Traffic Control Practices (Sir A. P. Herbert would like this!) has also been at work and recognises the need for regional organisations to co-ordinate air traffic control and that these regional organisations should conform to PICAO standards as closely as possible. Each would deal with problems peculiar to their particular routes and areas. This committee also recommends that air traffic control training should be standardised. Very sensibly, the committee has complained about the use of the word "contact" when applied to "no-see-no-fly" operations. This word has been used for half-a-dozen matters in aviation, and the committee-recommends that it should be replaced by "visual" in all terminology dealing with non-instrument flying situations.

GUIDE FOR G.E.S.

IN order to deal with the inevitably large number of enquiries being received from released Service engineers who wish to continue their career in civil aviation, the Society of Licensed Aircraft Engineers has recently produced a booklet guide to the whole situation. Naturally, enough, in the present state of the air transport picture, it is not possible for this booklet to answer questions about the possibilities or otherwise of employment, but it explains the general position and described the organisation of civil aviation, while giving full details of the licence categories, necessary qualifications and examination requirements. All of which will be of great help to the ex-Service G.E. who has had no previous experience of such work as a civilian. The address of the S.L.A.E. is 224, Regent Street (third floor), London, W.1.

THE LANCASHIRE CLUB AGAIN

FIRST of the old-established flying clubs to indicate a full return to life is the Lancashire Aero Club, which for very many years before the war operated from Woodford. For the moment the temporary address of the club is 23, Deanway, Wilmslow, Manchester, where the pre-war chief instructor, Wing Cdr. W. L. Woodward, A.F.C., is acting as honorary secretary to the embryo club.

CLUB SUBSIDIES FOR AUSTRALIA

THE Australian Government has decided to offer financial help to the reforming aero clubs. Each will be given a maintenance grant of £25 for every completed period of 50 hours flown by each aircraft, with a maximum of 200 hours for the year.

In addition, there will be an "issue" bonus of £50 for each *ab initio* pupil trained to "A" licence standard, and a renewal bonus of £10. In cases where costs are high, for instance, at up-country centres, the Civil Aviation Department is empowered to increase these last two figures to £60 and £12 10s. respectively. Wherever possible the necessary hangar accommodation and so forth will be made available without cost.

CHEAPER BY AIR

SOME idea of present-day light aircraft operating costs may be obtained from the figures given for a recent business flight from Rearsby to Denmark made recently by the Taylorcraft chief test pilot, Mr. G. Edwards. The trip was completed in a civilian Auster III, series J/1, via Manston, The Hague, Oldenburg, Lubeck and Copenhagen, and the flying time for the return journey was 15 hr. 25 min.

Since the distance covered is approximately 1,600 miles and 84 gallons of fuel were consumed, the average speed works out at 100 m.p.h. and the consumption at 19 m.p.g. In spite of the fact that the Cirrus engine had done more than 250 hours' flying previous to the trip, no oil was consumed, and the only work done on the aircraft was that entailed in a normal daily check-up. The payload was constant at 600 lb. and the entire trip, apart from personal expenses, cost rather less than £10.

Though business owners of light aircraft will receive special consideration from the fuel rationing authorities, it is sad to remember that this particular trip would, for a private owner, have involved the use of nearly four months' supply of rationed fuel.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

SHOCK TACTICS FOR SHOCK WAVES

Where Rockets Succeed, Can Jets be Far Behind?

"INDICATOR'S" article "Shock Tactics for Shock Waves" in the December 6th issue of *Flight* sounds a very plausible warning, but, also from the point of view of a "semi-technical outsider," I would like to query his conclusions and invite further information from aerodynamic specialist readers.

The suggestion that we are probably going the wrong way about "going over the hump," and that we are not likely to be able to do it without atomic propulsion, appears unlikely in view of the several promising supersonic winged rocket missiles developed by the Germans. Where rockets succeed, can jets be far behind? Is the air intake problem really so serious as to render the jet unsuitable?

Further, we hear that some of our own jet engine designers are working on the estimate that a thrust/projected area ratio of 1,500 lb./ft.² is adequate for exceeding Mach 1.0, and that an engine of 1,000 lb./ft.² is now in design. They believe that so far as propulsion is concerned, "it's in the bag," but that control and structure problems will require much more effort and experiment for their solution.

I would like to ask readers who are expert in this field to provide us with more compressibility information, including an explanation of the abnormally large degree of aerofoil sweep-back on the German rocket missiles, which appears to be their only basically unorthodox feature. STRESSMAN.

[The above letter was received after last week's issue had gone to press, and is not a reply to "ex-S.T.P.," who commented on "Stressman's" previous letter.—ED.]

PRIVATE AIRCRAFT

Two Distinct Types Needed

OF all the articles and suggestions dealing with private aircraft, it is remarkable how few recognise the need for two distinct types, i.e., the touring aircraft and the sporting aircraft.

Two current light types, the Auster and Messenger, are no doubt good aircraft for touring purposes, but they are not particularly suitable for sporting flying. First and most important because their initial and maintenance costs, though perhaps reasonable for the aircraft themselves, are not attractive when the prospective owner wishes mainly to fly solo and does not desire the upkeep of a three- or four-seater aircraft.

The second point is that, to get the most out of flying, an open cockpit seems desirable, or at least a sliding hood of the tear-drop variety.

Also, whereas the touring machine needs a cruising speed of 100 m.p.h. or over, the sporting aircraft is concerned mainly with staying up in the air! Within reason, the slower the cruising speed the better, for this will mean low fuel consumption and more hours flying for a given outlay.

The requisite type obviously falls in the ultra-light class of machine. Why these aircraft have found only limited popularity is not clear, unless it is that too many have been carelessly built by enthusiastic amateurs or flown by people who could not appreciate the flight limitations of low power, with consequent accidents and an apparently poor safety record for anything below 40 h.p.

What would not help to increase their numbers is that aircraft designers delight in solving problems which necessitate introducing much complex equipment, but when it comes to the reverse (simplicity and low cost) they are nowhere to be seen.

The popular newspapers publicise the "everyman's" aircraft from time to time in the shape of the conventional high-wing cabin type, but knowledgeable comment would not take long to show that these same machines are very far from being "everyman's" where the costs are concerned.

Very light types are so few in numbers that they rarely if ever hit the headlines, and there might be reason to assume the public is ignorant of their existence.

The few successful types which have appeared have often gone out of production for what seems no reason at all, certainly not because of technical faults. A good example of this was the Carden-Baynes auxiliary sailplane. By all reports the characteristics of this machine were excellent, and the fact that it was primarily a sailplane meant that the cost could be kept low.

The disadvantage of the sailplane proper is the need for the right type of country if it is to get a good send-off, otherwise towing must be used to give it height. This fact limits soaring to particular areas, and is the chief reason why the sport cannot achieve greater popularity. The Carden-Baynes machine overcame this by employing a small power unit, completely retractible (propeller included), which could be used for the take-off and until a suitable altitude was reached. In spite of this ingenious feature very few machines were ever built.

To find where all the gremlins of lower power and cheap flying are hidden may not be an easy task, but the sooner they are dealt with, the sooner will we be able to explore this important section of private flying.

DOUGLAS DEANS.

COCKPIT CLASSIFICATION

A Compromise Suggested

WRITING as an ex-A.T.A. pilot with some experience of stepping into strange aircraft, I venture to express my opinion on the merits and demerits of Flt. Lt. White's suggestions in the article on "Cockpit Classification" in your issue of December 13th.

I am in complete agreement with his plea for "grouping." Since the bad old days the aircraft industry has progressively endeavoured to iron the kinks out of flying by the application of new aerodynamic principles and increased engine efficiency, and by the use of devices to increase the margin of safety. Inversely, however, with increased efficiency, greater wing loadings and faster landing speeds, the aircraft of to-day becomes, when misused, increasingly a lethal weapon, and the operation of it more complicated and requiring a higher degree of concentration.

In considering cockpit layout, therefore, the chief object should be to endeavour to avoid dividing the pilot's attention during operations which require the maximum concentration—such as those involved in take-off and landing. This, I am convinced, can be helped by the standard grouping of the main engine instruments in the way in which the b.f. panel has already been standardised.

It is, I think, quite hopeless to expect the aircraft industry to standardise layout to the extent of the pattern laid down by Flt. Lt. White. With the diversity of types, insurmountable difficulties would arise. If his colour theory were introduced, in addition to the existing kaleidoscopic effect of twinkling lights and coloured devices, the result would be indescribably chaotic.

A compromise might, however, be effected which, while making the pilot's lot a great deal easier, would not cause too much trouble to the manufacturer. On single-engined aircraft the following would be the ideal arrangement.

The Sperry panel would be mounted slightly to the left of the facia board, while, mounted similarly on the right, would be a standard grouping of the main engine instruments in the order of use, as below:—

M. & S. Switch	Boost Gauge	A.S.I.	Revolution counter	Gill (or rad. shutter) switch
	Oil pressure	Oil temp.	Coolant (or cyl. hd.) temps.	

Mag. switches, starter button, booster coil.

Assuming that the benevolent designer has been good enough to arrange his flap and undercarriage levers conveniently on the port side, so, correspondingly, should the indicators be on the extreme left of the panel, and not haphazardly positioned. The operating limits of the various types of engine vary through a wide range of tolerances—even in different marks. Thus an oil pressure of 50lb./sq. in. on a Merlin 30 would not excite undue comment, while the same reading on a Packard-engined Mustang IV would be the signal for an emergency landing. On most American aircraft lines are painted on the dials indicating the maximum, minimum and normal operating figures, and this could be incorporated on British instruments without any difficulty. This would at least obviate the frantic hunt for the data panel usually so cunningly concealed under the cockpit coaming. Auxiliary instrument positioning can be left to the designer's discretion.

The hazards of high-speed approach are considerably increased by the need for ducking one's head to glance at the A.S.I. Some form of external and easily visible A.S.I. should be a standard fitting.

(Continued on page 23)

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The Minor and Junior: two Cirrus Minor 100 B.H.P. engines—max. sea-level speeds of 141 and 131 m.p.h. Cruising speeds (65% power) 119 and 111 m.p.h. Initial rates of climb 800 and 600 ft. per minute. All-up weight 3,450 lb. The Major and Junior carry 6, and the Minor 5 for short or medium ranges. The long-range Major with pilot, two passengers and ample baggage has a 1,000 mile-range.

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CORRESPONDENCE

The application of such standardisation should present no insuperable difficulties.

Finally, cockpit checks. Flt. Lt. White appears to have laboured this point unduly. The A.T.A., after a period of trial and error, formulated six groups of letters into a standard check. This was taught to *ab initio* pupils in ground school, and they thereafter applied it to every type of aircraft.

The six groups were as follows:—

Take-Off Preparation: H.T.T.M.P.P.F.G.G.
(Hydraulics, Trimmers, Throttle, Mixture, Pitch, Petrol, Flaps, Gills, Gauges.)
Turning into Wind: F.U.S.T.
(Fuel Boosters, Unlock Controls, Supercharger Medium, Tail Wheel Locked.)
Landing Preparation, First Crosswind Leg: P.B.F.
(Petrol, Brakes, Fuel Boosters.)
Downwind Leg: H.U.M.
(Hydraulics, Undercarriage, Mixture.)
Final Crosswind Leg: F.P.G.
(Flaps, Pitch, Gills.)
End of Landing Run: T.G.F.
(Tail Wheel unlocked, Gills open, Flaps up.)

It was proved by results that if these checks were conscientiously carried out on all types of aircraft, the chances of errors or oversight were negligible. With proper tuition they can be quickly grasped by the average mentality and for the minority who can't (or won't), well, in the words of *Cautionary Tales for Children*, "They answered as they took their fees, there is no cure for this disease."

P. L. B.

AIRCRAFT ENGINEERS

Trade Unions' Encroachments

I AM a very proud member of the Aeronautical Engineers' Association, and, as such, I crave space in your columns to answer Miss Patricia Parker.

Miss Parker is, I am afraid, jumping to a conclusion that was never justified by the Association's resolution condemning Air Ministry policy in accepting the principle that only pre-war 1939 apprentice-trained men are skilled aircraft maintenance engineers, in that she takes the pre-war 1939 apprentice-trained men referred to, to be those people who held ground engineers' licences prior to the recent war. She develops her argument around this theme, but the premise is altogether wrong, and it is indeed regrettable that Miss Parker did not trouble to gain some insight into the conditions pertaining in this branch of engineering at the present day before seeking to champion a cause that, as yet, needs no Sir Galahad. All Miss Parker has succeeded in doing is to display a not very small, and quite unenviable, ignorance of what is a very major problem in the industry. I refer, of course, to the position of so-called dilutee tradesmen.

For Miss Parker's benefit allow me to elaborate a little on the Association's resolution. At the outbreak of war the need for additional and very large-scale development of the engineering industries was apparent. The trade unions concerned, notable among which was the Amalgamated Engineering Union agreed to a scheme known as the Relaxation Customs Agreement. This allowed for the drafting of great numbers of men and women into the various branches of engineering, such as shipbuilding and repairing, aircraft construction, etc., and it provided for the discharge from the industry of these intakes when the national emergency had passed, in order that the apprentice-trained man would not suffer undue hardship in the post-war years.

The essential idea behind the scheme was that men and women could be given a brief training to acquaint them with the handling of tools and the use of measuring instruments; they could then work in the industry in a productive capacity, *under the supervision and guidance of a fully trained and skilled man*. Viewed in a broad aspect the plan worked admirably, the normal practice being for the dilutee workman to be fully trained in one, or possibly two, small processes, so that he quickly became fairly efficient and could be relied upon to produce to a reasonable standard on repetition work.

However, there was another branch of engineering where the demands could not be satisfied in so simple a fashion. In the aircraft industry, bombers and training machines were coming forward in numbers that rendered their service and maintenance impossible with the trained personnel available, for, while ground engineers may have been "ten a penny" in pre-war days—and in using that phrase I treat with supply and demand, not with ability—there were, after all, not so *very* many of them. Many of them were R.A.F. reservists and got an urgent call to service; the balance was to be found manning flying schools' ground staffs. It was necessary, then, that some other method should be found whereby the maintenance units and repair depots should be efficiently staffed. It need not concern us here why these units should be civilian manned. Suffice it to say that trained personnel was needed to do the job, and a different scheme was devised to meet the case.

The training-centre period was lengthened, and after the tool handling stage had been safely passed an intensive training in the rigging of aircraft, oleo legs, principles of flight, etc., in the case of riggers, and the complete "gen" on aircraft engines in the case of fitters, was embarked upon. A post-training-centre period of further training at an R.A.F. camp was instituted, this to embrace such subjects as hydraulics, metals, skin repairs, etc., so that by the time the *final* examination was passed, a fair knowledge of aircraft had been accumulated and it only remained to put that knowledge into effect as practical and useful work. There can be no argument on whether this has been successfully done. If the Air Ministry decided that, as a matter of extreme urgency, standards should here and there be modified, it is not right to assume that no one outside the Air Ministry was aware of it, and that a return to peace would call for a return to peace-time standards. Nor does it follow that these workers will find themselves unable to reach that standard, for they have kept very well abreast with modern development and have, in the main, four to five years' work on aircraft behind them, which, on Miss Parker's own admission, should be ample to give them their status.

However, the trades unions are not inclined to favour such an idea and take a very jaundiced view of any suggestion that these workers should rank as skilled. It is their avowed ambition to hound these people out of the industry and to that end the mighty A.E.U. has classified them as "dilutees." The original title given them was "tradesmen of trainee origin," and they were treated and paid as fully skilled men. There was never any question of their being subjected to apprentice-trained supervision, but rather it was the case that the trainees often had to show apprentice-trained men the ropes. All work done by them was signed for on official forms (F1860 or F700), and full responsibility allocated and accepted.

It is the contention of the A.E.U. that a bench fitter from a gun shop is more qualified to maintain and service aircraft than this trainee of wartime. To what depths will British aviation sink if such a contention is upheld! The Aeronautical Engineers' Association bitterly opposes it as being rank injustice and prejudicial to our country's interests. It is the aim of the Ae.E.A. to bind this section of the aircraft industry closely; to preserve and even raise the standard of the worker and thereby increase the prestige of British aviation at home and abroad. The A.E.U. would have our aviation the stamping ground for those who cannot find work in their proper sphere. The T. and G.W. would place it on common ground with bus and trammen.

It would be good indeed if all who have the interests of aviation and the aviation worker really at heart would study present conditions closely. They would no longer carry false ideas and values, nor would they wonder at the Ae.E.A. resolution, but rather would they identify themselves with that body and offer co-operation, so that these evils and encroachments could be stopped before it is too late.

I hold no position in the Ae.E.A., and my remarks should not be taken as being in any way the official viewpoint of the Association.

THOS. W. REID.

No Reflection on War-trained Men

IN reference to my original letter in *Flight*, November 22nd, I would like to make it quite clear that no reflection whatever was intended upon the war-trained engineer, as such. It is merely that he is the unfortunate victim of circumstances, inasmuch as he has not had experience of peacetime maintenance under A.R.B. requirements; by reason of the exigencies of war his training is not likely to have been as thorough as that of an apprentice-trained man who has had years in which to absorb a knowledge of his trade. The experience of the wartime engineer, however, may in many cases have been more varied.

My suggestion was that the Air Ministry might thus have some justification for their attitude having regard to the fact that peacetime maintenance standards and requirements obtaining before this war, definitely were higher and more stringent than those obtaining during the war—the old safety factor again.

However, Mr. Stevenson's admirable letter appears to have clarified the reason for the resolution being passed. I fully share the Association's views on this policy (as he anticipates!) if it goes to the ridiculous lengths cited in the case of No. 23 M.U.

It makes one wonder who we have in the Air Ministry—maybe some agricultural engineers?

(Miss) P. M. PARKER.

INTERNATIONAL TEST TRAINING: On the recently completed 1945 course at the Empire Test Pilots School, now at Cranfield, there was a more than representative series of pupils. Apart from our own R.A.F., R.N., Dominion and civil pilots the pupils included U.S. Army and Navy, Chinese, Dutch, Belgian and French pilots. Group Capt. H. J. Wilson, A.F.C., of world's speed record fame, is Commandant of the School.

SERVICE AVIATION

Royal Air Force and Naval Air Arm News and Announcements

Appointments

Royal Navy

VICE-ADMIRAL Sir Arthur J. POWER, K.C.B., C.V.O., is appointed a Lord Commissioner of the Admiralty and Chief of Naval Personnel (Second Sea Lord). As a Captain, in 1938, Vice-Admiral Power was Flag Captain and Chief Staff Officer in the aircraft carrier H.M.S. Ark Royal.

REAR-ADMIRAL A. R. M. BRIDGE, C.B.E., succeeds Vice-Admiral C. Moody as Flag Officer Commanding Aircraft Carriers and Naval Air Stations, East Indies Station.

Royal Air Force

The Air Ministry announces the following R.A.F. appointments:—

Air Vice-Marshal R. GRAHAM, C.B., C.B.E., D.S.O., D.F.C., A.F.C., to be Head of Air Section, U.K. Mission to Australia.

Air Vice-Marshal Sir B. E. BAKER, K.B.E., C.B., D.S.O., M.C., A.F.C., to be Deputy Air C.-in-C., H.Q., R.A.F., Mediterranean/Middle East.

Air Vice-Marshal G. A. H. PIDCOCK to be President of Ordnance Board, Ministry of Supply.

Air Vice-Marshal D. V. CARNEGIE, C.B.E., A.F.C., to be R.A.F. Adviser to the High Commissioner for Canada.

Air Vice-Marshal A. P. M. SANDERS, C.B., C.B.E., to be Commandant, R.A.F. Staff College.

Air Vice-Marshal E. S. GOODWIN, C.B., C.B.E., A.F.C., to be Air Officer in Charge of Administration, H.Q. Bomber Command.

Air Comdre. E. F. WARING, C.B.E., D.F.C., A.F.C., to be A.O.C., No. 225 Group, Base Air Forces, South East Asia.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Distinguished Flying Cross

Act. Sqn. Ldr. P. W. PERCY, R.A.F.V.R., No. 15 Sqn.
Act. Sqn. Ldr. L. H. WAKEFORD, R.A.F.V.R., No. 159 Sqn.
Act. Sqn. Ldr. F. C. YOUNG, R.A.F.V.R., No. 142 Sqn.
Flt. Lt. W. BEARDSWORTH, R.A.F.V.R., No. 195 Sqn.
Flt. Lt. J. O. BIGGS, R.A.F.V.R., No. 10 Sqn.
Flt. Lt. H. V. BLAND, R.A.F.V.R., No. 162 Sqn.
Flt. Lt. T. A. BOWEN, R.A.F.V.R., No. 163 Sqn.
Flt. Lt. W. K. BROWN, R.A.F.V.R., No. 142 Sqn.
Flt. Lt. C. E. CAIGER, R.A.F.V.R., No. 608 Sqn.
Flt. Lt. R. C. CARTER, R.A.F.V.R., No. 571 Sqn.
Flt. Lt. A. A. B. CLEAVER, R.A.F., No. 571 Sqn.
Flt. Lt. W. CLEGG, R.A.F.V.R., No. 619 Sqn.
Flt. Lt. K. G. CONDICT, R.A.F.V.R., No. 514 Sqn.
Flt. Lt. W. E. CONNOR, R.A.F.V.R., No. 625 Sqn.
Flt. Lt. R. G. CROCKER, R.A.F., No. 622 Sqn.
Ft. Lt. R. DRURY, R.A.F.V.R., No. 10 Sqn.
Flt. Lt. F. C. J. ELLAS, R.A.F.V.R., No. 1409 Flt.
Flt. Lt. H. LEYTON-BROWN, R.A.F.V.R., No. 576 Sqn.
Flt. Lt. G. G. LILES, R.A.F.V.R., No. 214 Sqn.
Flt. Lt. J. LILLEY, R.A.F.V.R., No. 625 Sqn.
Flt. Lt. A. J. MARSHALL, R.A.F.V.R., No. 162 Sqn.
Flt. Lt. J. MARSON, R.A.F.V.R., No. 162 Sqn.
Flt. Lt. J. R. MAUNSELL, R.A.F.V.R., No. 223 Sqn.
Flt. Lt. W. V. MORGAN, R.A.F.V.R., No. 77 Sqn.
Flt. Lt. S. A. NOLAN, R.A.F.V.R., No. 142 Sqn.
Flt. Lt. E. C. ORR, R.A.F.V.R., No. 90 Sqn.
Flt. Lt. L. L. PEARSE, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
Flt. Lt. J. A. PERRY, R.A.F.V.R., No. 692 Sqn.
Flt. Lt. J. R. RANDALL, R.A.F.V.R., No. 102 Sqn.
Flt. Lt. T. W. REECE, R.A.F.V.R., No. 90 Sqn.
Flt. Lt. J. H. B. RICHARDS, R.A.F.V.R., No. 162 Sqn.
Flt. Lt. E. ROBINSON, R.A.F.V.R., No. 83 Sqn.
Flt. Lt. A. P. RUSSELL, R.A.F.V.R., No. 625 Sqn.
Flt. Lt. J. W. SHAW, R.A.F.V.R., No. 109 Sqn.
Flt. Lt. H. J. SMITH, R.A.F.V.R., No. 142 Sqn.
Flt. Lt. E. THOMPSON, R.A.F.V.R., No. 138 Sqn.
Flt. Lt. R. P. THOMSON, R.A.F.V.R., No. 100 Sqn.
Flt. Lt. R. W. TOOTHILL, R.A.F.V.R., No. 635 Sqn.
Flt. Lt. C. E. TWITE, R.A.F., No. 195 Sqn.
Flt. Lt. J. R. VICKERS, R.A.F.V.R., No. 138 Sqn.
Flt. Lt. F. D. WALLACE, R.A.F.V.R., No. 156 Sqn.
Flt. Lt. J. WARD, R.A.F.V.R., No. 550 Sqn.
Flt. Lt. P. L. WHITAKER, R.A.F., No. 105 Sqn.
Flt. Lt. A. F. WIMSETT, R.A.F., No. 627 Sqn.
Flt. Lt. G. W. WINSTANLEY, R.A.F.V.R., No. 166 Sqn.
Flt. Lt. J. A. WYMARK, R.A.F.V.R., No. 106 Sqn.
Act. Flt. Lt. J. W. ALLISON, R.A.F.V.R., No. 115 Sqn.
Act. Flt. Lt. V. G. BARRY, R.A.F.V.R., No. 90 Sqn.
Act. Flt. Lt. J. S. BARTON, R.A.F.V.R., No. 90 Sqn.
Act. Flt. Lt. A. D. D. BRIAN, R.A.F.V.R., No. 189 Sqn.
Act. Flt. Lt. F. BROOKES, R.A.F.V.R., No. 156 Sqn.
Act. Flt. Lt. K. BROWN, R.A.F.V.R., No. 97 Sqn.
Act. Flt. Lt. F. R. CORK, R.A.F.V.R., No. 15 Sqn.
Act. Flt. Lt. G. W. DAGGETT, R.A.F.V.R., No. 44 Sqn.
Act. Flt. Lt. H. T. EVANS, R.A.F.V.R., No. 51 Sqn.
Act. Flt. Lt. H. E. FORSDIKE, R.A.F.V.R., No. 158 Sqn.
Act. Flt. Lt. K. GREEN, R.A.F.V.R., No. 12 Sqn.
Act. Flt. Lt. G. G. HALE, R.A.F.V.R., No. 635 Sqn.
Act. Flt. Lt. O. C. HODSON, R.A.F.V.R., No. 227 Sqn.
Act. Flt. Lt. P. HOYLAND, R.A.F.V.R., No. 102 Sqn.
Act. Flt. Lt. S. J. HUBBARD, R.A.F.V.R., No. 78 Sqn.
Act. Flt. Lt. A. G. HUGHES, R.A.F.V.R., No. 1409 Flt.
Act. Flt. Lt. M. C. J. MARK, R.A.F.V.R., No. 214 Sqn.
Act. Flt. Lt. E. MCNAMARA, R.A.F., No. 199 Sqn.
Act. Flt. Lt. F. MILLER, R.A.F.V.R., No. 635 Sqn.
Act. Flt. Lt. F. A. NEWELL, R.A.F.V.R., No. 10 Sqn.
Act. Flt. Lt. D. F. O'SULLIVAN, R.A.F.V.R., No. 78 Sqn.
Act. Flt. Lt. H. W. W. PARKS, R.A.F.V.R., No. 635 Sqn.
Act. Flt. Lt. W. R. PONT, R.A.F.V.R., No. 77 Sqn.
Act. Flt. Lt. B. B REID, R.A.F.V.R., No. 171 Sqn.
Act. Flt. Lt. C. A. A. RIST, R.A.F.V.R., No. 90 Sqn.
Act. Flt. Lt E. A. SANDERS, R.A.F.V.R., No. 78 Sqn.
Act. Flt. Lt. F. SMITH, R.A.F.V.R., No. 57 Sqn.
Act. Flt. Lt. G. E. STEMP, R.A.F.V.R., No. 630 Sqn.
Act. Flt. Lt. L. E. TOMKINS, R.A.F., No. 424 (R.C.A.F.) Sqn.
Act. Flt. Lt. G. W. W. WADDINGTON, R.A.F., No. 432 (R.C.A.F.) Sqn.
Act. Flt. Lt. P. WAKE, R.A.F.V.R., No. 227 Sqn.
Act. Flt. Lt. C. G. WALKDEN, R.A.F.V.R., No. 158 Sqn.
Act. Flt. Lt. N. E. WILKINS, R.A.F.V.R., No. 7 Sqn.
Act. Flt. Lt. J. C. WILSON, R.A.F.V.R., No. 7 Sqn.

Badge of No. 847 Squadron, Naval Air Arm—"Ex Alto Concutimus" (We Shake Them From on High). On a blue field a sea lion winged gold.

Badge of No. 888 Squadron, Naval Air Arm—"Sine Missione" (No Quarter). On a blue field a martlet, white, over water in base barry wavy, white and blue.

Act. Flt. Lt. T. D. WOLFSON, R.A.F.V.R., No. 149 Sqn.
Act. Flt. Lt. C. M. ZAGERMAN, R.A.F.V.R., No. 100 Sqn.
F/O. F. S. ADLEY, R.A.F.V.R., No. 550 Sqn.
F/O. J. ALLAN, R.A.F.V.R., No. 7 Sqn.
F/O. R. E. S. ANDREW, R.A.F.V.R., No. 7 Sqn.
P/O. W. V. HAYDEN, R.C.A.F., No. 158 Sqn.
P/O. J. KATRICHAK, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
P/O. J. F. O. MAJOR, R.C.A.F., No. 77 Sqn.
P/O. M. K. MCGRATH, R.C.A.F., No. 582 Sqn.
P/O. F. W. OEHM, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
P/O. P. W. RAWLYCK, RC.A.F., No. 434 (R.C.A.F.) Sqn.
P/O. R. H. MCG. RONEY, R.C.A.F., No. 625 Sqn.
P/O. R. G. STORSATER, R.C.A.F., No. 158 Sqn.
W/O.1 B. B. COLLINGS, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
W/O.2 F. P. LANGLEY, R.C.A.F., No. 158 Sqn.
W/O.2 (now P/O.) J. L. LABRIMORE, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
W/O.2 H. I. MIDDLETON, R.C.A.F., No. 9 Sqn.
W/O. E. A. STEWART, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
W/O.2 (now P/O.) G. P. STORRY, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. N. A. F. ATKINS, R.N.Z.A.F., No. 10 Sqn.
F/O. A. C. JENSEN, R.N.Z.A.F., No. 44 Sqn.
F/O. A. G. LEECH, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
F/O. C. N. MARTIN, R.N.Z.A.F., No. 166 Sqn.
F/O. J. S. MUIR, R.N.Z.A.F., No 10 Sqn.
F/O. I. G. SUTHERLAND, R.N.Z.A.F., No. 44 Sqn.
W/O. W. W. BESWARICK, R.N.Z.A.F., No. 619 Sqn.
W/O. P. A. CANNONS (now P/O.), R.N.Z.A.F., No. 7 Sqn.
W/O. W. O. C. MCKAY, R.N.Z.A.F., No. 158 Sqn.

Distinguished Flying Medal

Flt. Sgt. R. E. MARTIN-SMITH, R.A.F.V.R., No. 550 Sqn.
Flt. Sgt. K. F. MITCHELL, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. M. A. MORLEY, R.A.F.V.R., No. 12 Sqn.
Flt. Sgt. G. W. MURRAY, R.A.F.V.R., No. 101 Sqn.
Flt. Sgt. R. ORMEROD, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. R. PERRY, R.A.F.V.R., No. 582 Sqn.
Flt. Sgt. A. REDNER, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. W. RITCHIE, R.A.F.V.R., No. 582 Sqn.
Flt. Sgt. K. R. K. RUDGE, R.A.F.V.R., No. 101 Sqn.
Flt. Sgt. N. MCC. SCOTT, R.A.F.V.R., No. 635 Sqn.
Flt. Sgt. (now P/O.) A. W. SMITH, R.A.F.V.R., No. 153 Sqn.
Flt. Sgt. R. SMITH, R.A.F.V.R., No. 101 Sqn.
Flt. Sgt. R. STEAD, R.A.F.V.R., No. 102 Sqn.
Flt. Sgt. C. D. STOKES, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. L. W. TANNER, R.A.F.V.R., No. 9 Sqn.
Flt. Sgt. (now P/O.) W. THOMPSON, R.A.F.V.R., No. 149 Sqn.
Flt. Sgt. A. B. TILSON, R.A.F.V.R., No. 153 Sqn.
Flt. Sgt. A. V. TOWNSEND, R.A.F.V.R., No. 550
Flt. Sgt. W. T. N. TROWHILL, R.A.F.V.R., No. 635 Sqn.
Flt. Sgt. T. J. TREBILCOCK, R.A.F.V.R., No. 617 Sqn.
Flt. Sgt. J. E. WALDRON, R.A.F.V.R., No. 90 Sqn.
Flt. Sgt. L. WHISKIE, R.A.F.V.R., No. 15 Sqn.
Flt. Sgt. C. WILCOX, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. F. E. YOUNG, R.A.F.V.R., No. 7 Sqn.
Act. Flt. Sgt. J. SELLS, R.A.F.V.R., No. 582 Sqn.
Act. Flt. Sgt. F. A. WEBBER, R.A.F.V.R., No. 582 Sqn.
Sgt. S. W. CARR, R.A.F.V.R., No. 128 Sqn.
Sgt. W. COSTIGAN, R.A.F.V.R., No. 158 Sqn.
Sgt. (now P/O.) A. HARRISON, R.A.F.V.R., No. 426 Sqn. (R.C.A.F.)
Sgt. J. E. S. LEASK, R.A.F.V.R., No. 90 Sqn.
Sgt. (now P/O.) M. A. POTTER, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
Sgt. K. SOCKETT, R.A.F.V.R., No. 156 Sqn.
Sgt. J. G. TAYLOR, R.A.F.V.R., No. 9 Sqn.
Flt. Sgt. E. P. O'MALLEY (now P/O.) R.A.A.F., No. 128 Sqn.
Flt. Sgt. I. C. MCLEOD (now P/O.), R.A.A.F., No. 142 Sqn.
Flt. Sgt. W. J. PURDY (now W/O.), R.A.A.F., No. 189 Sqn.
Flt. Sgt. (now P/O.) J. E. MCGILL, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
Flt. Sgt. G. A. MCMURCHY, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
Flt. Sgt. (now P/O.) J. A. STAPLETON, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
Sgt. (now P/O.) F. EDWARDS, R.C.A.F., No. 426 (R.C.A.F.) Sqn.

Roll of Honour

Casualty Communiqué No. 557.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of these names in this list, 185 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. R. Alderson; F/O. D. Beaton, D.S.O.; Flt. Sgt. J. G. Brittain; Sgt. A. Burton; Flt. Sgt. A. Cauchi; Flt. Lt. G. N. Chandler; Flt. Sgt. J. A. S. Coutts; Flt. Sgt. A. G. Davies; Sgt. W. H. Engelhardt; Flt. Lt. A. John; Flt. Sgt. A. McMurrugh; F/O. E. G. Powell; Sgt. J. N. Sims; Act. Air Vice-Marshal J. R. Scarlett-Streatfeild, C.B.E.; W/O. G. E. Thompson, D.F.M.; Flt. Sgt. C. Williams; Flt. Sgt. W. H. Withers.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt F. R. Abbott; Sgt. C. D. Bassett; F/O. J. D. Booth; Sgt. T. Boyle; F/O. R. Brown; Sgt. R. Eayres; Flt. Sgt. J. E. W. Fenwick; F/O. H. T. Ford; Sgt. P. N. Fudge; F/O. F. E. R. Gurden; Sgt. P. H. F. Hughes; Sgt. A. F. Liddle; Flt. Sgt. E. S. McCleave; Flt. Sgt. A. G. Mace; P/O. K. R. Mead, D.F.C.; Sqn. Ldr. A. A. F. Mills; Flt Sgt. J. Musk; Flt. Sgt. A. J. Osborne; F/O. A. Pirie; F/O. R. R. Preece; Sgt. P. Radley; Sgt. W. T. Stapleton; Sgt. K. K. Thomson; Sgt. P. L. Waldon.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. R. W. Agg, D.F.M.; F/O. S. M. Anderson; Sgt. C. L. Atkins; Flt. Sgt. T. Bell; Sgt. D. H. Beresford; Sgt. N. D. Bishop; Sgt. R. Black; P/O. A. J. Bolter; P/O. R. W. Burkwood; Sgt. A. F. Butcher; Sgt. C. R. Canday; Flt. Sgt. G. Chaffe; Sgt. R. Charlton; Sgt. A. Clark; P/O. E. S. Clark, D.F.C.; Sgt. J. Court; Sgt. J. B. Cowie; Sgt. K. J. Cresswell; Flt. Sgt. D. R. Croker; Flt. Sgt. J. Datson; W/O. W. J. Davies; Sgt. C. N. G. Drew; Sgt. W. J. Dunn; Flt. Sgt. H. Earl; Sgt. J. F. P. Edwards; Sgt. D. Eggleston; Flt. Sgt. D. J. Evans; Sgt. J. Fingleton; Sgt. J. D. Francis; Sgt. J. W. Freeborn; Act. Flt. Lt. L. A. French; Sgt. R. W. French; Flt. Sgt. A. Fretwell; Sgt. J. Geeves; Flt. Sgt. J. W. Gibbs; Flt. Sgt. P. A. Gilfeather; Sgt. J. Gill; Sgt. R. W. P. Gillham; Sgt. H. C. Greb; Flt. Sgt. C. W. Greenaway; F/O. J. R. Green; Flt. Sgt. J. E. Halshaw; Flt. Sgt. J. Hands; Sgt. T. E. Hayes; F/O. J. A. Hodgson; P/O. L. Honor; Flt. Sgt. C. H. Houghton; Sgt. R. Houseman; Sgt. E. B. Hudson; Sgt. E. C. Hum; P/O. N. A. Ireland; Sgt. T. L. Jackson; Sgt. H. E. Jeffery; Sgt. M. L. Jones; Sgt. R. Knapton; P/O. D. Langford; Sgt. R. V. Lawrence; Flt. Sgt. S. R. Lewis; Sgt. J. Manion; Sgt. W. J. Marks; Sgt. J. E. Massey; Sgt. W. V. Matthews; Sgt. G. B. C. Moore; Sgt. A. T. T. Morrell; Sgt. D. F. Newsham; Sgt. R. J. Norman; Sgt. H. J. P. O'Brien; Sgt. T. R. Owen; Sgt. E. G. Paradise; Sgt. W. N. Partridge; Sgt. H. Pickford; Flt. Lt. R. W. Reynolds; F/O. R. E. Richardson; Flt. Sgt. E. B. Riley; P/O. K. Robinson; F/O. R. Sanford; F/O. B. Shepstone; Sgt. N. H. Shergold; Sgt. H. R. Smith; Flt. Sgt. F. S. Sparrow; Flt. Sgt. L. A. Starr; Sgt. D. A. Stephens; Flt. Sgt. H. J. W. Stevens; Sgt. R. J. Taylor; Sgt. G. T. Tipping; Sgt. T. E. Walker; F/O. F. E. Wareham; P/O. A. J. Weaver; Flt. Sgt. H. G. West; Sgt. R. P. Whitehall; Flt. Sgt. G. A. Wilby; W/O. G. A. Williams; Sgt. T. W. Willis; Sgt. F. D. Wills; Sgt. A. Wilson; Sgt. C. F. Wilson; Sgt. N. L. Wood; W/O. F. Woolmington.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. J. C. Bracegirdle; Sgt. J. W. Briers; Sgt. R. Cowham; Flt. Sgt. A. M. W. Gilbert; Flt. Sgt. V. H. Grayson; F/O. A. J. Jenkins, D.F.C.; F/O. I. Partington; Flt Sgt. J. McD. Reid; Sgt. J. P. Rowley; Flt. Sgt. E. Schofield; Sgt. J. T. Theaker; W/O. H. E Turner, D.F.M.; Sgt. H. Twell.

MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. T. Lupton.

WOUNDED OR INJURED IN ACTION.—Sgt. H Shankland; Flt. Sgt. P. E. Woodham.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. L. A. Fowler.

MISSING.—Sgt. R. F. Atkins; P/O. G. R. Bradfield; Sgt. D. A. Faulkner; F/O. A. J. Gudge; Flt. Sgt. W. R. Harris; Sgt. J. Hughes; Sgt. P. R. J. Kingham; Sgt. G. C. H. Lauener; Flt. Sgt. G. E. Lewis; Sgt. J. H. Lister; F/O. L. E Nixon; Flt. Sgt. J. Thompson; Flt. Sgt. H. G Yorke.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. E. R. Lynn.

R.A.F. WAR COMMANDERS

Air Marshal Sir Roderic Hill

Caricature portrait by Hayden

AIR MARSHAL SIR RODERIC HILL, K.C.B., M.C., A.F.C., will be remembered by different people in different ways. *Flight* remembers him chiefly as a one-time contributor, for he is a front-rank aircraft artist. Others will think of him as the author of a most fascinating book, *The Baghdad Air Mail*, which told the story of how the R.A.F. blazed the trail for civil flying between Baghdad and Cairo. Nasty work it must have been flying over the desert in those days, when the only safe guide was the track of a convoy of motor vehicles. If one flew low enough to keep the track in sight one got terrifically bumped; and if one flew at a comfortable altitude one lost sight of the track and was lost. Quite a number of men will chiefly think of Sir Roderic as a popular Chief Instructor of the Oxford University Air Squadron.

Sir Roderic's fighting career started in October, 1914, when he enlisted in the Royal Fusiliers. Two years passed in infantry service before he joined the Royal Flying Corps. Then he won the Military Cross and later the Air Force Cross. The latter decoration only came into being with the formation of the Royal Air Force. After the Armistice he passed through the R.A.F. Staff College. Then came his period of service in Iraq, when he commanded No. 45 (Bomber) Squadron and wrote the delightful book we have mentioned above. After his work at Oxford (during which time he was made an honorary Master of Arts) he was Air A.D.C. to the King for two years.

Next he became A.O.C., Palestine and Jordan. In 1942 he was Commandant of the Staff College. Next he commanded a Fighter Group and in 1943 became A.O.C., Air Defence of Great Britain—now known as Fighter Command. Since May, 1945, he has been Air Member for Training in the Air Council.

SERVICE AVIATION

KILLED ON ACTIVE SERVICE.—Sgt. S. J. Alderson; F/O. J. C. Baker, D.F.C.; Flt. Lt. J. M. W. Briggs, D.S.O., D.F.C., D.F.M.; F/O. D. H. Bull; F/O. R. H. Casburn; Flt. Sgt. V. H. Clare, D.F.M.; L.A/C. R. G. Clark; W/O. J. Coghlan; Flt. Sgt. R. H. Cowan; Flt. Lt. I. J. A. Cruickshanks; L.A/C. R. G. Curtis; W/O. G. Davies; Flt. Sgt. W. Dexter; Sgt. F. P. A. Donovan; W/O. F. W. Duck; Flt. Lt. W. G. Eagle, D.F.C.; Sgt. J. G. O. Gunn; Flt. Lt. J. E. A. Hartill; Flt. Sgt. E. A. Hawes; Flt. Sgt. W. A. Heslop; F/O. L. D. H. Jenner; Sgt. J. A. Keeping; Flt. Sgt. S. Lawson; Sgt. W. L. McDonald; Flt. Sgt. E. V. Matthews; Flt. Sgt. W. Nattrass; W/O. J. D. Ornesher; Flt. Sgt. N. V. Ryder; Flt. Sgt. R. J. Tebby; F/O. J. E. Timms; Sgt. S. Turner; W/O. S. H. Vetters; Sgt. W. H. Wallace; Flt. Lt. T. P. Walsh; W/O. S. J. Webb; P/O. K. R. Wells; Sgt. G. S. Whitehouse; W/O. N. W. Wynn.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. M. Blenkinsop; P/O. W. D. Crebbin; Sgt. J. E. Parkin; L.A/C. E. J. Skeggs; Flt. Sgt. F. Thompson; F/O. E. A. Tragheim.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. T. H. Geary; Sgt. L. Hawkes; W/O. G. C. Iverson; Act. Sqn. Ldr. J. A. Perkins; Cpl. J. W. Whyte.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Act. Sqn. Ldr. J. N. Williams.

DIED ON ACTIVE SERVICE.—Flt. Lt. D. W. Allen; L.A/C. F. G. Andrews; Flt. Sgt. D. Bauldie; L.A/C. F. C. Bosher; L.A/C. G. L. Bunting; L.A/C. W. J. Breach; A/C.2 D. Broddle; Flt. Sgt. E. A. Bryan; Cpl. H. R. Buck; Cpl. A. Bullock; L.A/C. T. Clark; Sqn. Ldr. E. H. Davy; A/C.2 J. Edwards; L.A/C. D. J. Gibbons; Group Capt. J. F. Griffiths, D.F.C.; Flt. Lt. G. R. Guest; Sgt. L. A. G. Hale; L.A/C. W. J. Hall; P/O. J. H. Haseldine; F/O. P. D. Hayes; Sqn. Ldr. H. B. Hunt; L.A/C. H. H. Lord; L.A/C. T. McKie; L.A/C. J. McLean; L.A/C. W. Miller; P/O. D. L. Mothersole; A/C.1 A. Palin; L.A/C. F. H. Palmer; A/C.2 I. O. Palmer; L.A/C. F. J. Pemble; Cpl. N. L. Pocock; A/C.1 T. R. Prentice; Flt. Sgt. J. W. C. Pulham; Cpl. J. Rothwell; A/C.1 R. P. Simmonds; Cpl. J. Smith; W/O. J. C. Sowden; L.A/C. V. B. Symons; Cpl. J. Taylor; L.A/C. J. Trainer; F/O. C. H. Veitch; F/O. E. M. Wilkinson; Act. Flt. Lt. J. Williams; A/C.2 P. J. Wynne.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. M. E. D. Wilson

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. F. R. M. Cook; Act. Sqn. Ldr. W. W. B. Gale; W/O. A. H. J. Harris; P/O. G. D. Long.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. K. F. Allen; Flt. Lt. W. W. Boylson, D.F.C.; F/O. N. B. Carrall; Flt. Sgt. J. Lawton; F/O. T. J. McGrath; Act. Sqn. Ldr. R. S. O. Marshall, D.F.C.; P/O. J. T. Milliner; Flt. Sgt. T. G. D. Mills; P/O. J. Mitchell; Flt. Sgt. W. Murphy; P/O. R. J. O'Sullivan; P/O. R. F. Philp; P/O. M. Rose; F/O. F. R. Tickle; Flt. Sgt. H. J. Tolhurst; P/O. J. E. F. Wall.

WOUNDED OR INJURED IN ACTION.—F/O. A. L. Paltridge; F/O. D. R. Rutter.

INFORMAL SCENE at a house party given in honour of Prince Bernhard of the Netherlands by Air Chief Marshal Sir Sholto Douglas, K.C.B., M.C., D.F.C., Air C.-in-C. of the British Air Forces of Occupation. Left to right are Air Marshal G. O. Johnson, R.C.A.F., S/O. June Lee, W.A.A.F., Prince Bernhard, Sir Sholto, Air Vice-Marshal C. R. Steele, Flt. Officer E. R. Petrie and Flt. Officer S. Cull, personal secretaries to Sir Sholto.

MISSING.—Flt. Lt. G. W. J. Fenwick; P/O. O. E. Goddard; P/O. R. B. Goodwin; F/O. H. C. Tyas.

KILLED ON ACTIVE SERVICE.—W/O. K. N. Doyle; F/O. A. L. Fox.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. D. G. F. Macrae.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. O. C. Evers; F/O. R. B. Hilchey; Flt. Lt. L. E. Prowse; Sqn. Ldr. D. R. Robertson, D.F.C.; Flt. Lt. N. L. Roseblade; Flt. Lt. R. J. Stingle; Flt. Sgt. R. MacP. Toms.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. M. P. Laycock.

MISSING.—F/O. A. B. Boyd; W/O. J. E. Brambleby; Flt. Lt. A. B. Ely; Flt. Lt. B. D. Emmet; F/O. W. E. Hanna; Flt. Sgt. V. E. Hovey; W/O. C. R. I. Mark; Flt. Sgt. R. J. Mellon; Flt. Sgt. K. M. Rupert; Sgt. A. L. Rutter; F/O. J. K. Stanley.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. A. R. Armstrong; F/O. O. R. Gillette; F/O. W. J. Long; Sgt. A. F. W. Torbett; Flt. Sgt. B. Trymbulak.

KILLED ON ACTIVE SERVICE.—W/O. M. C. Cameron; Flt. Lt. T. H. Cameron, D.F.C.; F/O. A. A. Clifford; F/O D. A. Fehrman; Flt. Sgt. C. J. Halvorson; F/O. G. J Hay; W/O. J. A. Hay; Flt. Sgt. L. C. Hellekson; F/O. H. A. Jones; P/O. K. B. McIvor; F/O. F. W. Mossing; L.A/C. L. M. Thomas, F/O J H. Vanular; Sgt. T. A. Vincent.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. E. F. Insley.

DIED ON ACTIVE SERVICE.—F/O. B. C. Hunt; F/O. L. J. Kelly.

PREVIOUSLY REPORTED PRISONER OF WAR, NOW REPORTED DIED ON ACTIVE SERVICE.—P/O. W. F. Nicholls.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. J. D. K. Sterling.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt Sgt. G. H. Reid.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. M. J. Steel.

MISSING.—F/O. A. A. Kingsbury.

DIED ON ACTIVE SERVICE.—F/O. H. S. Young.

South African Air Force

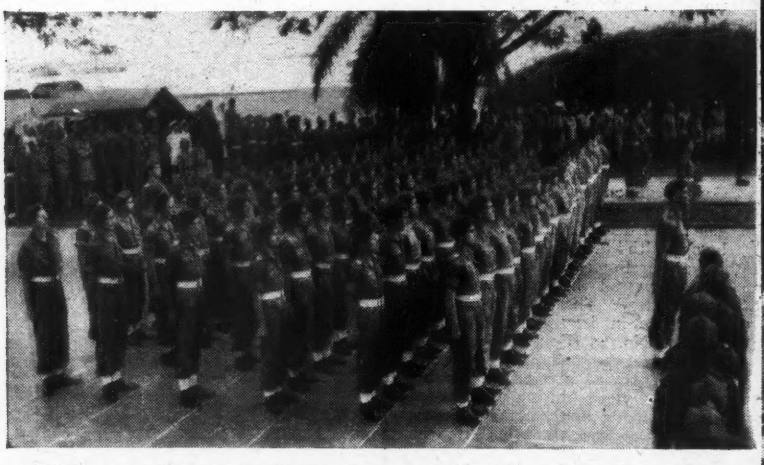
MISSING.—Lt. D. R. Hattingh.

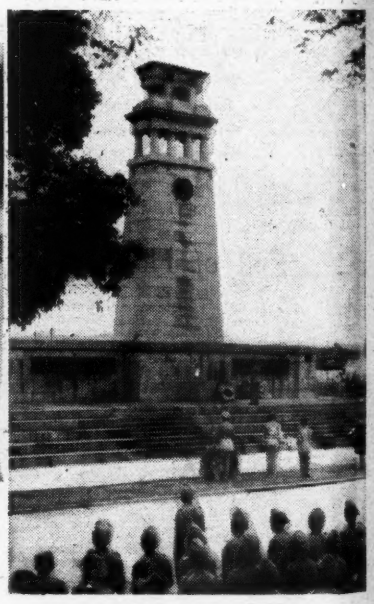
WOUNDED OR INJURED ON ACTIVE SERVICE.—Lt. N. Bayley, D.F.C.

DIED ON ACTIVE SERVICE.—Air Mech. E. A. Seith; Air Mech. D. W. N. Torrington.

Royal Indian Air Force

DIED ON ACTIVE SERVICE.—L.A/C. Caras.





SINGAPORE ARMISTICE CEREMONY: Members of the R.A.F. were among those who commemorated Armistice Day at Singapore. The photograph above shows R.A.F. Regiment men (of the only parachute trained squadron in S.E.A.C.), who took part in the ceremony. (Right) Air Comdre. J. H. Cohu, Commander of the R.A.F. Base, lays a wreath on the Cenotaph

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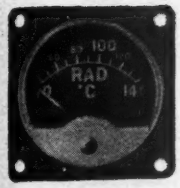

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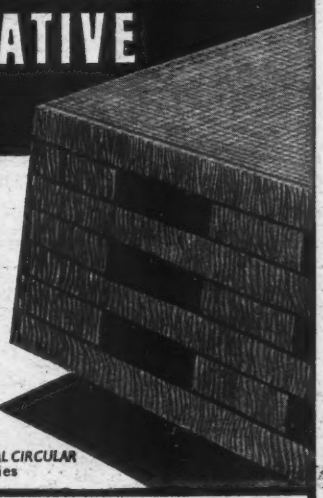

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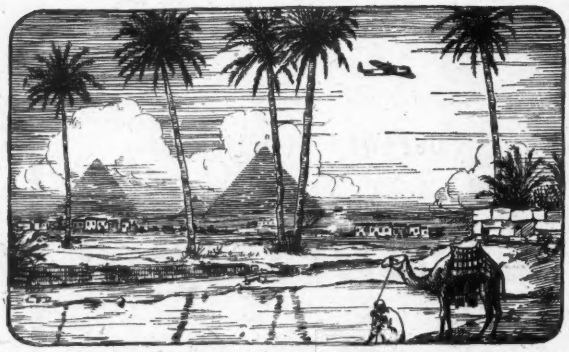

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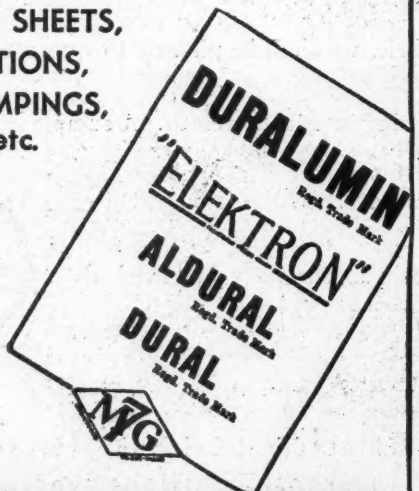

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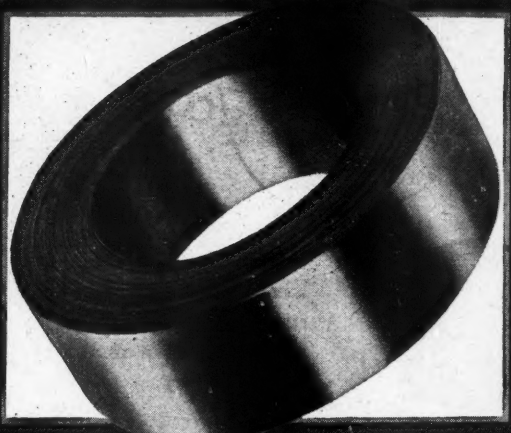

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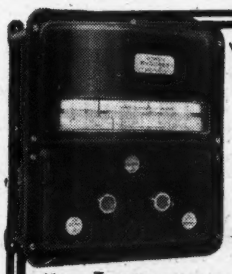

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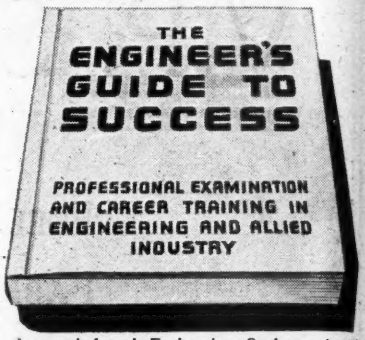

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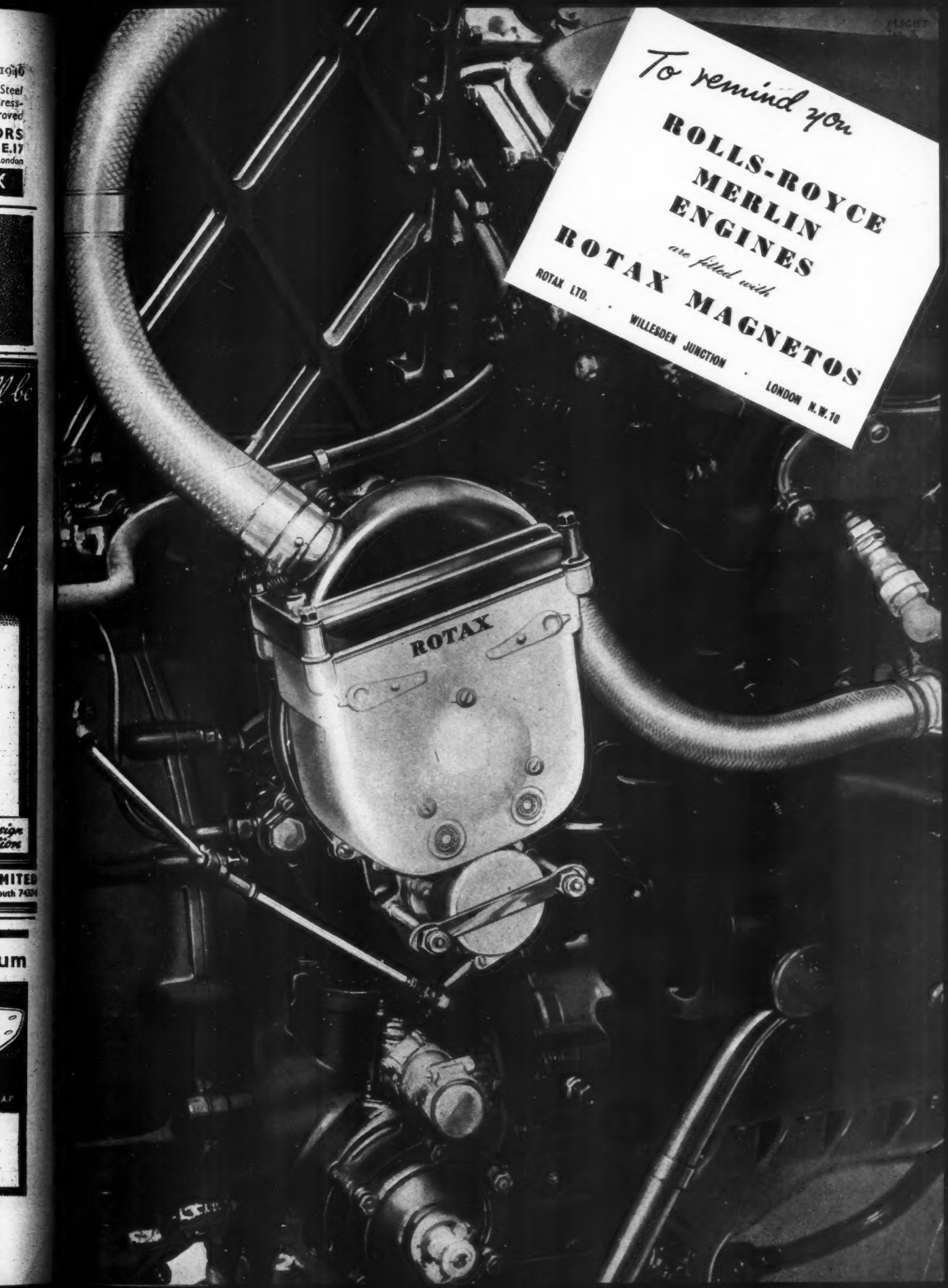
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